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CONTENTS

THE WHOLE OF THE LITERARY MATTER IN THE LANCET IS COPYRIGHT

ADDRESSES AND ORIGINAL ARTICLES

The Iron-deficiency Anæmias. By R. BODLEY SCOTT, M.R.C.P. 549

The Angle of Abduction of the Hip after Subtrochanteric Osteotomy. By H. J. SEDDON, F.R.C.S. (*illus.*) 552

Experimental Exchange Transfusion Using Purified Heparin. By W. THALHIMER, M.D., D. Y. SOLANDT, M.D., and Prof. C. H. BEST, M.D., F.R.S. (*illus.*).... 554

Synthetic Desoxycorticosterone Acetate in Addison's Disease. By S. L. SIMPSON, M.R.C.P. 557

Acute Ulcerative Stomatitis. By E. W. FISH, M.D., D.D.Sc..... 558

Hyperplastic Tuberculosis of the Cæcum: Radiological Diagnosis. By F. G. WOOD, M.B., D.M.R.E., and M. C. WILKINSON, M.B. (*illus.*) 560

Antibacterial Power of the Blood of Patients Receiving 2-(*p*-Aminobenzenesulphonamido) Pyridine. By Prof. A. FLEMING, F.R.C.S. 564

CLINICAL AND LABORATORY NOTES

Rheumatoid Arthritis Treated by Multiple Arthrotomy and Lavage. By O. A. SAVAGE, M.R.C.P. (*illus.*) 567

Bone Abscess Caused by *Bacillus aertrycke*. By D. L. STEVENSON, F.R.C.S.E. (*illus.*).... 569

Repair of a Fistula of the Penile Urethra. By H. L. ATTWATER, F.R.C.S., and J. R. HUGHES, F.R.C.S.E. 569

REVIEWS AND NOTICES OF BOOKS

Science for the Citizen. By L. Hogben 573

Suicide. By H. R. Fedden 573

Surgical Pathology of the Diseases of the Neck. By Prof. A. E. Hertzler, M.D. 573

Veterinary Pathology and Bacteriology. By S. H. Gaiger, F.R.C.V.S., and G. O. Davies, M.R.C.V.S. 574

Quarterly Journal of Medicine 574

LEADING ARTICLES

DE-MECHANISED WELFARE 575

RENAL CALCULI AS A COMPLICATION 576

THE DOCTOR AND HIS EMPLOYEES 576

ANNOTATIONS

Diagnosis of Syphilis..... 578

Phosphatase Test 578

Serum Transfusion in Nephrosis 579

Instruction in Mothercraft. 579

Pneumococcus Types in South Africa 579

Mercury Treatment and G.P.I. 580

Science and Social Relations 580

The Friendly Enemy 581

Tuberculous Sequences ... 581

PUBLIC HEALTH

Diphtheria Immunisation: Optimum Spacing of Doses of Alum-precipitated Toxoid. By G. CHESNEY, M.D..... 587

Infectious Disease in England and Wales.... 602

GRAINS AND SCRUPLES

By "Hakim"—I 589

SPECIAL ARTICLES

Prognosis in Carcinoma of the Breast. By R. W. SCARFF, M.B., and R. S. HANDLEY, M.B..... 582

British Medical Association:—Section of Physical Medicine: Basis of National Fitness 570

Physiological Congress at Zürich 584

Medicine and the Law: Tuberculosis and Workmen's Compensation ... 572

United States of America: Serum Treatment of Type I Pneumonia..... 584

Nutrition in Australia: Report of the Advisory Council 585

Synthetic Chemistry and Medicine: The British Association Symposium . 591

THE LANCET 100 Years Ago 597

PANEL AND CONTRACT PRACTICE

The Position in New Zealand—"I hereby Certify ..." 588

CORRESPONDENCE

Testimonials (Dr. F. J. Poynton) 593

Venereal Diseases (Dr. E. E. Prebble) 593

Maternal Mortality and Medical Education (Sir E. Graham-Little, F.R.C.P., M.P.) 593

Continuous Drainage in Cerebro-spinal Fever (Dr. C. G. K. Thompson) 594

Control of Undulant Fever (Mr. E. S. Shaxson)..... 594

Hyperplasia of the Male Breast Accompanying Malignant Disease of the Testis (Dr. C. W. B. Woodham)..... 595

MEDICAL NEWS

University of Cambridge .. 595

Welsh National School of Medicine 595

Society of Apothecaries ... 595

Medical Society of London 595

London Hospital 595

National Hospital for Diseases of the Heart... 595

Westminster Hospital 595

St. Bartholomew's Hospital 595

Saunders Books 595

London Hospitals Street Collections 581

Fellowship of Medicine.... 586

London Emergency Bed Service 577

OBITUARY

Alexander Macphail, M.D. (*with portrait*) 596

William Delano Walker, M.B. 596

The late Dr. Alfred Campbell 597

NOTES, COMMENTS, AND ABSTRACTS

Treatment of Dysmenorrhœa. By Miss A. D. STEVENSON 599

Silicosis Studies in France. 600

Holidays for Working Women 601

A Doctor Under the Knife 601

New Preparations: Lactoflavine B.D.H.—Heparin 318 Roche—"Vaporole" Solution of Adrenaline—Streptocide Solution—Calcydic Tablets—Gynœstryl 601

A New Cigarette-holder... 602

Elementary Statistics 602

University of London O.T.C. 602

Vacancies 598

Births, Marriages, Deaths 598

Appointments 602

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ADDRESSES AND ORIGINAL ARTICLES

THE IRON-DEFICIENCY ANÆMIAS*

BY R. BODLEY SCOTT, M.A., D.M. Oxon., M.R.C.P.

FIRST ASSISTANT, THE MEDICAL PROFESSORIAL UNIT, ST. BARTHOLOMEW'S HOSPITAL, LONDON; ASSISTANT PHYSICIAN, WOOLWICH WAR MEMORIAL HOSPITAL

ALTHOUGH the group of anæmias resulting from deficiency of iron has been studied intensively in the past decade it still lacks the conceptual unity possessed by the anæmias due to deficiency of the liver principle. Increasing knowledge of the metabolism of iron has provided a clue to this problem (Hahn 1937, Heath and Patek 1937).

An iron-deficiency anæmia may be defined as any anæmia that responds to adequate doses of iron. An attempt will be made to show that in all the heterogeneous conditions which come within this definition the anæmia can be satisfactorily explained on a basis of deficiency of available iron and that the ways in which this deficiency may be brought about are similar in all cases. The blood picture in all iron-deficiency anæmias is the same: the hæmoglobin is diminished but the red blood-cells are not reduced in like proportion. The colour-index is therefore low. In some cases the red blood-cells are smaller than normal; in the remainder their size is within normal limits. It is thus a hypochromic anæmia which may or may not be microcytic. The leucocyte count varies between 2000 and 10,000 per c.mm. but shows no specific alteration.

IRON METABOLISM

Before the mechanism of the production of iron deficiency can be understood it is necessary to refer to one or two points in our somewhat limited knowledge of iron metabolism. The total amount of iron in a healthy adult is between three and four grammes and it exists in three main forms. First, the iron of the circulating hæmoglobin which has an average total of 2·3 g.; secondly, iron stored in the liver, bone-marrow, and spleen which is available for conversion into hæmoglobin should need arise. Clinical experience shows that a healthy man may reduce his hæmoglobin to 50 per cent. and subsequently repair the anæmia without administration of iron; so it may be taken that the available iron stores are equivalent to about half the hæmoglobin-iron or 1·15 g. Thirdly, a small amount exists in the tissues in an unavailable form.

Knowledge of the absorption of iron from the alimentary tract is imperfect. The main site of this process is probably the duodenum, but we are ignorant of the form in which it takes place. Local conditions in the gastro-intestinal tract closely influence absorption. Gastric acidity favours the preservation of ferrous ions and diminishes the formation of insoluble iron compounds; consequently achlorhydria militates against absorption. Increased speed of transit such as may follow gastric operations has an unfavourable effect which may be aggravated by the alkalinity of the pancreatic juice and the insolubility of the iron salts of bile acids. Excretion is almost entirely by the bowel; the iron excreted by the kidneys does not amount to more than 0·25 mg. per week.

The minimum daily iron requirements for a healthy adult male vary between 5·0 and 1·0 mg. The figures are not satisfactory for from balance experiments it seems probable that such a person, provided he starts adult life with a full complement, would never develop symptoms of iron deficiency however low his intake in the absence of blood loss. The proportion of iron present in the diet which is absorbed and can be used for hæmoglobin formation depends upon the foodstuff and upon the individual; experimentally under the most favourable conditions the available iron seldom exceeds 60 per cent. of the total iron content of the food.

Certain physiological requirements for iron are obvious; in both male and female there is an increased demand during periods of rapid growth for the blood volume grows with increase in stature and iron is required to produce the extra hæmoglobin. In both sexes the most rapid periods of growth are during the first two years and at puberty and consequently at these times the demand is at its height. The increase in circulating iron in a male between birth and twenty-one years is over two grammes. In the female the physiological requirements are considerably greater, for in addition to her needs for growth there is a constant toll on her iron stores by menstruation, pregnancy, and lactation. With each catamenia there is a loss of about 50 c.cm. of blood representing some 23 mg. of iron; with pregnancy it is not less than 400 mg. and possibly as much as 600 mg., and during lactation the loss is of the order of 0·85 mg. per diem. The total physiological iron requirements during life for a man amount to between 3 and 4 g., while a woman will need about four times that amount.

It is clear that in the absence of pathological blood loss, iron deficiency is most likely to occur when the organisms' demands are greatest. From these considerations iron deficiency may be expected particularly during the first year in both sexes when growth is rapid; at puberty on account of rapid growth in the male but more probably in the female as this drain on the reserves is associated with the establishment of menstruation. Here perhaps is the physiological justification for the lay expression "outgrowing one's strength." Furthermore, in women iron-lack may manifest itself during pregnancy or toward the end of the reproductive period of life when more than thirty years of menstruation, punctuated by pregnancies and periods of lactation, have slowly depleted the body's store of the element. To these physiological processes must be added two morbid factors: first, pathological blood loss; and secondly, diminished iron uptake. The latter may be conditioned by abnormalities of the gastro-intestinal tract such as achlorhydria, gastric operations, or steatorrhœa, or may depend upon a diet of low iron content. In many cases both factors are operative. Finally, chronic infection, while it cannot of itself produce iron deficiency, undoubtedly interferes with the bone-marrow's utilisation of the element.

CLINICAL PICTURES

Iron-deficiency anæmia presents itself in a number of clinical forms, which may be detailed as follows:—

1. Hypochromic anæmia consequent upon overt blood loss.
2. Hypochromic anæmia associated with hepatolienal fibrosis.
3. Hypochromic anæmia of infants.
4. Chlorosis.
5. Hypochromic anæmia of pregnancy.
6. "Idiopathic" hypochromic anæmia.

* A post-graduate lecture to the Leicester Medical Society on May 4th.

1. *Overt blood loss* will rapidly lead to a state of iron deficiency. It is recognised that an adult may lose about half his total blood volume and yet mend the consequent anæmia completely without the administration of iron; but this may only happen once, for the repair of the anæmia will have exhausted the whole of the available iron store in the body and thereafter every milligramme of hæmoglobin lost is hæmoglobin which cannot be replaced until the patient be given more iron. Once the iron reserve has been depleted in this way anæmia will develop rapidly from what may seem trivial loss of blood and will persist after the hæmorrhage has stopped because the raw material for manufacture of hæmoglobin is lacking. In such patients achlorhydria is frequently present further to diminish iron absorption. Of the last five patients I have seen with anæmia following hæmorrhage from piles there was post-histamine achlorhydria in four. It is important to recognise that hypochromic anæmia of this type does not necessarily mean that blood loss is occurring when the patients come under observation; it may be a legacy from a past hæmorrhage. Tacitus records the case of Paulina, the wife of Seneca, in whom a single hæmorrhage resulted in anæmia which lasted throughout the rest of her life.

The causative hæmorrhage may be from any site provided it be blood irretrievably lost; blood effused into tissues is broken down and its iron returned to store. Gastro-intestinal and uterine hæmorrhages account for the majority of severe anæmias of this group, and in a world-wide census the commonest cause would probably be blood loss due to infestation by the hookworm.

2. *Hepatolienal fibrosis associated with hypochromic anæmia* is but a synonym for "splenic anæmia." Since Davidson (1934) has shown that hypochromic anæmia in these cases responds to iron it follows from our premises that the anæmia of "splenic anæmia" is due to iron deficiency. In the majority of cases anæmia is only found after hæmorrhages, and the frequency of hæmatemesis and bleeding hæmorrhoids has long been recognised; to this must be added the frequent coexistence of achlorhydria to diminish absorption of iron and dyspepsia with consequent dietetic restriction limiting its intake. There is little reasonable doubt that the majority of cases of "splenic anæmia" are instances of a splenic and hepatic fibrosis with a hypochromic anæmia due to an iron deficiency arising from the causes detailed.

3. *Hypochromic anæmia of infants* constitutes a common and important clinical entity which has been thoroughly investigated by Mackay (1931). The anæmia develops between the third and twelfth months when rapid growth makes a heavy call on the available iron. During this period the iron intake, especially in a bottle-fed child, is infinitesimal and if the child has entered the world insufficiently endowed with iron anæmia is certain to result. The iron stores at birth are derived from the mother and the factors which may lead to a child being born without its full complement are: first, prematurity, when it is born before sufficient iron is laid down in store; secondly, in the case of twins the available iron has to be shared between two; and thirdly, maternal anæmia when insufficient iron is available.

This infantile anæmia has a very real importance, for Helen Mackay has shown that the morbidity-rate in infants whose diet is supplemented with iron is only half that of a control group.

4. *Chlorosis* is commonly spoken of as a disease which has accompanied tight-lacing into the limbo of forgotten things; but this is only a partial truth. Hypochromic anæmia is still seen at times in adolescent girls and it has been shown how the combination of rapid growth with the establishment of menstruation might be expected to lead to iron deficiency. The explanation of the current rarity of chlorosis is probably twofold. First, the higher dietetic standards of the present day—especially in childhood—may provide sufficient iron for the girl to pass through this critical period without developing overt iron deficiency; and secondly, with the more thorough investigation to which patients are now submitted the label chlorosis would only be attached to cases where no obvious cause for the anæmia, such as menorrhagia, could be found. Chlorosis still occurs, but it is called by other names.

5. *Hypochromic anæmia of pregnancy.*—In any normal pregnancy there is a reduction in the hæmoglobin percentage due to an increase in the volume of circulating plasma. This dilution effect has been spoken of as a "physiological anæmia." The average reduction of hæmoglobin is about 10 per cent. During pregnancy there is frequently a defective gastric secretion and a diet deficient in iron is almost the rule. In addition the fœtal demands for iron must be answered, although these are partially offset by the absence of menstrual loss; there is therefore reason why a moderate iron deficiency should arise. It has been shown that uncomplicated pregnancy is rarely associated with severe hypochromic anæmia (Bethel 1936, Fullerton 1936); in such circumstances the hæmoglobin seldom falls below 60 per cent. Severe anæmia means either that the patient was anæmic before she became pregnant or that such factors as infection, pregnancy toxæmia, or blood loss from piles are present.

6. "*Idiopathic*" *hypochromic anæmia* I have reserved for the end and for more detailed discussion. A multitude of synonyms exists for this type of anæmia and I have used what is perhaps the most common present-day title without subscribing to the suggestion implicit in "idiopathic." It is a disease limited to women, for although a similar clinical picture may be seen in men it is always associated with a past or present blood loss. The majority of the patients are nearing the end of the reproductive period of life and I have already shown how iron deficiency is liable to arise at this age. The mechanism of the production of "idiopathic" hypochromic anæmia is twofold: first, diminished iron uptake; secondly, increased iron loss. The diminished uptake may result in part from a diminished intake, for a diet poor in iron is a commonplace in the poorer classes. However Davidson and his colleagues (1933) have shown that the anæmia cannot be directly correlated with the iron content of the diet. Even if the intake be sufficient, absorption must often be defective, for three-quarters of these patients have an absolute achlorhydria. These two factors frequently combine to form a vicious circle: the achlorhydria being associated with dyspepsia, which in turn leads to further dietetic restriction until the patient subsists on little but bread-and-margarine, cups of strong tea, and proprietary remedies for indigestion.

Undoubted increased iron loss is present in nearly nine-tenths of cases; it is important to recognise that minor blood losses are often operative over a number of years and this determines the late onset of the anæmia. The importance of these various factors can be judged from Table I taken from Heath and Patek's (1937) excellent review of the subject.

If there be no pathological loss of blood it is easy to see how by the age of forty, twenty-five years of

menstruation, relieved only by occasional episodes of pregnancy and lactation, will have taken their toll of the body's iron stores. In some cases this physiological loss combined with defective uptake of iron may be sufficient to cause grave anæmia. But it must be remembered how difficult it is to draw a distinction in woman between pathological and physiological hæmorrhage; Hippocrates referred to menstruation as "the monthly purging" and many women still subscribe to the suggestion inherent in this phrase. "There is a good flow" they will say with evident self-satisfaction. So also in the atmosphere of relief and achievement which accompanies the successful outcome of childbirth a post-partum loss of two, rather than the estimated normal one, pint of blood may pass unremarked. When to these examples are added loss of blood from epistaxis, piles which bleed unseen, surgical operations, and the thousand and one opportunities which arise in the most placid existence for minor hæmorrhages, it will be appreciated how difficult it is to say in any one case that loss of blood has never transcended the physiological. For every blood loss, however insignificant, must be entered in the debit side of the account of iron metabolism; and when little is added to the original endowment in the credit columns the account is certain to be overdrawn by the age of forty.

TABLE I—ÆTIOLOGICAL FACTORS IN SIXTY CASES OF "IDIOPATHIC" HYPOCHROMIC ANÆMIA (Heath and Patek)

	Per cent.
Diet deficient in iron	62
Achlorhydria	75
More than four pregnancies	47
Pathological blood loss	88
Menorrhagia	62
Hæmorrhoids	23
Epistaxis	15
Other sources	15

The clinical picture of "idiopathic" hypochromic anæmia differs somewhat from that of iron deficiency occurring at other epochs of life. The usual patient is a middle-aged woman with "mouse-coloured" hair turning grey; increase in pigmentation about the neck and upper part of the chest is not uncommon. In addition to the physical signs which accompany any anæmia, remarkable epithelial changes are common. Epithelial atrophy of the upper reaches of the alimentary tract is the most frequent finding: the tongue is small, denuded of papillæ, and often sore; painful fissures at the angles of the mouth may be present; occasionally atrophy of the pharyngeal mucosa is associated with dysphagia—a condition dignified by the title of the Plummer-Vinson syndrome. The mucosal atrophy of the stomach may be seen gastroscopically and is the basis of the achlorhydria. In addition to these changes in the gastro-intestinal tract, alterations in the nails are common; they become more brittle, flat, and sometimes actually spoon-shaped (koilonychia). Splenomegaly is found in about 60 per cent. of cases but it is seldom of any considerable degree.

DIAGNOSIS

Certain points in the diagnosis of iron-deficiency anæmia merit discussion. I am starting from the assumption that a patient has been found to have an anæmia of low colour-index, the leucocyte count is normal, and there is no obvious cause for anæmia such as active gross hæmorrhage, uræmia, or severe infection. The case is probably one of iron-deficiency anæmia and it follows that in the great majority of such patients pathological blood loss is taking place or has occurred in the past. The first step is to exclude active hæmorrhage; inquiry regarding menorrhagia, epistaxis, and rectal hæmorrhage must be made in taking the history. There is only one situation where chronic blood loss may occur without the patient's cognisance and that is in the alimentary tract. For this reason the stools must always be examined for evidence of hæmorrhage; if inspection shows no overt blood to be present a test for occult blood must be done. If there be no menorrhagia, metrorrhagia, nor epistaxis, and three specimens of the stools give a negative occult blood test, it is safe to assume that there is no active pathological blood loss and treatment with iron may be instituted. If the stools contain obvious or occult blood further investigation is required; first, a proctoscope should be passed to determine whether hæmorrhoids are present. If proctoscopy is negative and a digital examination of the rectum reveals no abnormality, a radiological investigation of the gastro-intestinal tract will probably be required although it must not be forgotten that nose-bleeds or oozing gums may give a positive test for occult blood. If piles are found further examination will probably not be required beyond perhaps a sigmoidoscopy to exclude a rectal carcinoma, as it may be difficult to be certain that the hæmorrhoids are not an expression of more serious disease higher up the bowel. It is only when the graver causes of hæmorrhage have been carefully excluded that it is safe to consider the case one of "idiopathic" hypochromic anæmia.

TREATMENT

Once a complete diagnosis has been made treatment may be instituted. A complete diagnosis entails not merely the label of iron-deficiency anæmia but an understanding of how the deficiency has arisen in the case under consideration. It is imperative that the case be fully investigated before treatment is started or a satisfactory response to iron may produce a false sense of security in both patient and medical attendant, for the anæmia of many cases of gastric or colonic carcinoma will improve considerably with exhibition of iron.

If the hæmoglobin be below 65 per cent. the patient should be in bed. This point is frequently neglected and is undoubtedly responsible for some cases which seem refractory to treatment. The main indications are two: first, to arrest the blood loss where this is possible; and secondly, to replenish the patient's iron store. In cases where such gross disease as neoplasm of the gastro-intestinal tract is responsible for hæmorrhage, the treatment is clearly surgical when this is possible. The arrest of menorrhagia is frequently necessary and in women over forty induction of the menopause by hysterectomy or radiotherapy is often required. In younger women without such gross organic lesions as uterine fibroids the problem may be a very difficult one. Hæmorrhoids should be injected or removed. Injection often allows the patient to repair the anæmia before a more radical operation be undertaken. Piles may be injected safely in splenic anæmia and this is often necessary.

When the difficulties of absorption of iron from the alimentary tract are considered parenteral injection would seem to offer the most satisfactory means of administering it. But from the practical viewpoint this is not true. Injection is painful and may be accompanied by severe symptoms of intoxication. Iron salts are so cheap that they can be given

by mouth in enormous quantities at little cost, so that even if only 1 per cent. of the dose be absorbed treatment remains inexpensive. There is in fact never an indication for injection of iron; and while some of the preparations marketed for this purpose are ineffectual others are potentially dangerous. The ampoules of one well-known preparation contain iron cacodylate in quantity equivalent to about 1·5 mg. of pure iron, and in order to provide enough iron for a rise of hæmoglobin of 1 per cent., something like 16 of them would have to be given. On this basis, if the treatment of a patient with 35 per cent. hæmoglobin were undertaken a daily injection for about two years and ten months would be required to provide enough iron for the hæmoglobin to rise to 100 per cent. I say nothing of the expense for I fancy the patient would have succumbed to chronic arsenical poisoning from the other constituents of the ampoules long before his anæmia was repaired.

Much has been written of the advantages one iron preparation has over another and there is general agreement that, weight for weight, the bivalent ferrous salts are more effective than the trivalent ferric. However, from the practical standpoint the preparation of iron is relatively unimportant provided sufficient be prescribed. The minimal effective dose of a preparation has been defined as the dosage necessary to cure the great majority of cases; it is not a satisfactory means of assay but the only one available. The most common methods of prescribing iron are as Blaud's pill or ferric ammonium citrate; the minimal effective doses for these preparations are 60 and 90 grains a day respectively. The only reasons for selecting one form rather than another are palatability, cheapness, and portability. In Table II are set out various preparations of iron with their minimal effective daily doses and approximate daily cost as dispensed by a London chemist. It refers, of course, to their iron content alone, and not to any other valuable constituents some of them may possess.

TABLE II—COST OF EFFECTIVE IRON THERAPY WITH VARIOUS COMMON PREPARATIONS

Preparation.	Effective daily dose.	Daily cost.
Colliron (ferric hydroxide) ..	3½–5½ drachms	2½d.–4d.
Plastules (ferrous sulph.) ..	10 grains	4d.
Fersolate (ferrous sulph.) ..	9 ,,	½d.
Ferronyl (ferrous chlor.) ..	5–7½ ,,	3d.–4d.
Ferri et ammon. cit.	90 ,,	5½d.
Pil. ferri carb. (Blaud)	60 ,,	4d.
Ferri redact.	60 ,,	6d.

Once the anæmia has been repaired there is no need to continue iron treatment if the blood loss has been arrested. This has been conclusively shown by Heath and Patek (1937). A corollary of this is that if anæmia reappears after iron has been withdrawn, a continuance or repetition of hæmorrhage must be presumed.

CONCLUSION

An attempt has been made to demonstrate the essential unity of the anæmias which respond to iron therapy; how they may all be accounted for by factors which produce a debit balance of iron and how from these considerations certain therapeutic principles clearly emerge. In particular it has been emphasised that hypochromic anæmia due to deficiency of iron arises almost always from loss of blood. The first duty of the physician is to look for the cause of this hæmorrhage.

BIBLIOGRAPHY

Bethel, F. H. (1936) *J. Amer. med. Ass.* **107**, 564.
Davidson, L. S. P. (1934) *Lancet*, **2**, 593.
— Fullerton, H. W., Howie, J. W., Croll, J. M., Orr, J. B., and Godden, W. (1933) *Brit. med. J.* **1**, 685.
Fullerton, H. W. (1936) *Ibid*, **2**, 577.
Hahn, P. F. (1937) *Medicine, Baltimore*, **16**, 249.
Heath, C. W., and Patek, A. J., *Ibid*, p. 267.
Mackay, H. M. M. (1931) *Spec. Rep. Ser. med. Res. Coun., Lond.* No. 157.

THE ANGLE OF ABDUCTION OF THE HIP AFTER SUB-TROCHANTERIC OSTEOTOMY

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THE orthopædic surgeon is often called upon to deal with a patient who has one hip ankylosed in a deformed position with a certain amount of true shortening.

The operation commonly employed for the correction of this condition is osteotomy of the femur in the region of the lesser trochanter. Most surgeons take this opportunity of minimising the effect of the shortening by placing the affected limb in a position of abduction and maintaining this position while union is occurring.

This compensatory manœuvre has its limitations, though they have not yet been clearly defined. It is evident that fixation of a shortened lower limb in abduction always results in the appearance of a lateral spinal curvature. If the abduction is excessive it may lead to the production of a true scoliosis; or pain in the lower spinal and sacro-iliac joints; or, lastly, the lumbar spine may not be mobile enough to bend laterally to the required extent and the patient will then walk with a permanent list to the affected side. It is not my purpose to discuss the greatest angle to which a limb can be abducted with safety, since I have never felt justified in putting this question to the test of operative experiment, and I have no certain knowledge regarding the limit of safety. However, at a guess I would say that up to 20° of abduction is safe in an adult and 25° in a child.

If it is agreed that compensation for shortening by fixation of the hip in abduction is a sound procedure then it is obviously necessary to determine how much abduction should be allowed in any particular case. Most surgeons make a shrewd guess and hope for the best. The best does not always happen and I have seen several cases after osteotomy in which the boot on the *sound* side had to be raised because abduction on the affected side had been excessive. Fortunately it is possible to calculate the angle of abduction by a simple method and so construct a table that can be referred to readily.

In Fig. 1 A, F is the distance between the femoral heads and S is the true shortening. The position of the affected limb before operation is immaterial and it has been drawn in the neutral position with the pelvis level merely for the sake of simplicity. Fig. 1 B shows the state of affairs after osteotomy. I trust that it is unnecessary to prove in detail that the two angles marked A are equal; they are both the angle

of abduction. It is also clear that $\frac{S}{F}$ = sine A—i.e.,

$$\frac{\text{true shortening}}{\text{distance between the femoral heads}}$$

equals the sine of the required angle of abduction. Table I is worked out from this equation with the help of a sine table.

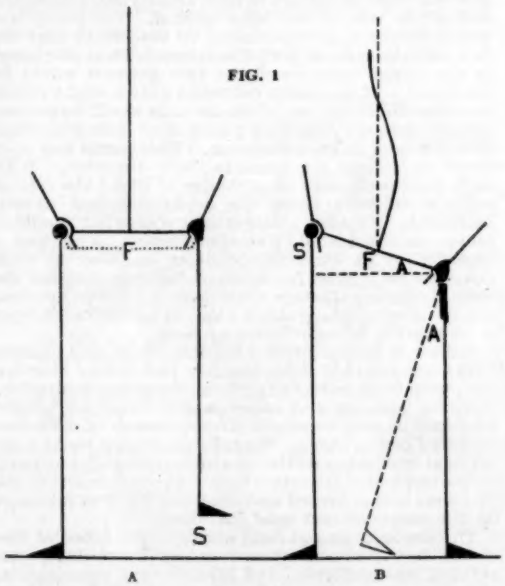
TABLE I—CORRECT ANGLE OF ABDUCTION WHERE DISTANCE BETWEEN FEMORAL HEADS CAN BE READ DIRECT—I.E., X RAY TUBE AT 6 FT.

True distance between femoral heads.	True shortening. ½″	1″	1½″	2″	2½″	3″	3½″	4″
5″	6°	12°	18°	24°				
6″	5°	10°	15°	20°	25°			
7″	4°	8°	12°	16°	21°	25°		
8″	3°	7°	11°	14°	18°	22°	25°	
9″	—	6°	10°	13°	16°	20°	23°	26°
10″	—	6°	9°	12°	15°	18°	21°	24°

Now comes the difficulty—how to determine the true distance between the femoral heads. The distance between the anterior superior iliac spines suggests itself as a basis. Several of the tables of thirty years ago depended in part upon this measurement. Unfortunately it is completely untrustworthy. Mr. R. G. Taylor was good enough to furnish me with figures dealing with this question and they show conclusively that there is no constant relation between the distance separating the anterior superior iliac spines and that between the femoral heads. A more direct measurement is essential.

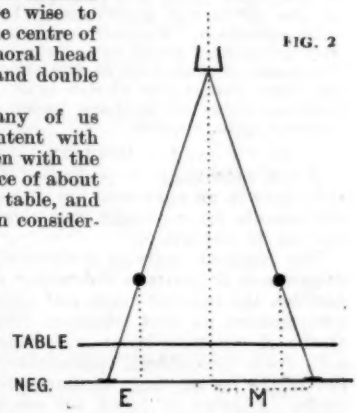
Starting from the work done by K. H. Pridie in connexion with fractures of the femoral neck, it might be possible in simple cases to arrive at a correct measurement by observing the distance between the femoral arteries at points just below the inguinal ligaments. But this would be useless if the affected hip was grossly flexed or adducted, and one would have to be content with doubling the distance between the femoral artery on the normal side and the midline.

FIG. 1



Measurement from a radiogram is the simplest method, but even here a correction may be necessary to allow for the magnification of the shadow resulting from spreading of the rays. With the tube at 6 ft. the error is in the neighbourhood of 6 per cent., which for present purposes is small enough to be negligible. The table already given is therefore approximately correct for radiograms taken with the tube at a distance of 6 ft. If there is gross bony distortion on the affected side, it may be wise to measure from the centre of the normal femoral head to the midline and double this distance.

FIG. 2



However, many of us have to be content with radiograms taken with the tube at a distance of about 30 in. from the table, and the error is then considerable. I have worked out a table of angles for use at the country branch of the Orthopædic Hospital where the tube is placed (for this work) at a distance of 30 in. from the X ray table, and the cassette is 1½ in. beneath the surface of the table. I have taken the distance between the centres of the femoral heads and the surface of the table as approximately 3 in.

From Fig. 2 it is clear that

$$\frac{\text{E (the error)}}{\text{M (the measurement on the negative)}} \text{ equals } \frac{\text{the distance between the femoral head and the negative}}{\text{the distance between the tube and the negative.}}$$

In actual figures

$$\frac{E}{M} = \frac{3'' + 1{\cdot}5''}{30'' + 1{\cdot}5''} = \frac{4{\cdot}5}{31{\cdot}5} = \frac{1}{7}$$

E = about 14 per cent. of M—an appreciable error.

In Table II this error is corrected.

TABLE II—CORRECT ANGLE OF ABDUCTION WITH TUBE 30 IN. FROM PATIENT AND 31½ IN. FROM CASSETTE

Distance between femoral heads on negative.	True shortening. ½″	1″	1½″	2″	2½″	3″	3½″	4″
6″	5°	11°	17°	23°				
7″	5°	10°	15°	20°	25°			
8″	4°	8°	12°	17°	21°	25°		
9″	—	7°	11°	15°	19°	23°		
10″	—	6°	10°	13°	17°	20°	24°	
11″	—	6°	9°	12°	15°	18°	22°	25°

The technique of placing the limb in the correct position after osteotomy is a matter for the individual surgeon, and there are probably several equally satisfactory ways of doing it. My own practice is as follows:

The anæsthetised patient is placed on a Hawley table, the feet are tied securely to the footpieces, the movable part of the table is lowered, and the operation is performed. This preliminary fixation abolishes all risk of slipping and over-riding of the two segments of the femur after osteotomy. After closure of the wound and application of the dressings the limb is placed in its final position. In order to obtain the correct angle a wooden lath (such as is used for the reinforcement of plasters) is placed in the line of the anterior superior iliac spines, and another in the line of the limb. The angle between them is measured with a large celluloid protractor, and the

limb is slowly abducted until the correct angle is obtained. Plaster is then applied, enclosing the whole of the affected limb, the normal limb down to the knee, and the trunk up to the level of the xiphisternum. A spica including only the affected limb may be unsatisfactory, since it does not prevent subsequent shifting of the pelvis. Even with the double spica there is a possibility that the position of the pelvis will alter during the first two weeks after operation. For this reason it is wise to take a radiogram after about two weeks, and measure on it the angle of abduction at the affected hip. If it is far from correct the plaster must be removed, the position corrected (perhaps under anæsthesia), and another spica applied.

SUMMARY

When osteotomy is performed for correction of deformity in an ankylosed hip, it is often possible to compensate for moderate true shortening by fixing the hip in abduction.

The required angle of abduction may readily be determined if the true shortening and the distance between the femoral heads are known. The second measurement is best obtained from a radiogram. If the X ray tube is at a distance of less than 6 ft. from the patient, appreciable magnification of the image occurs, and allowance for this must be made. A table is given for use with 6 ft. radiograms and one for radiograms taken with the tube at 30 in. from the X ray table.

EXPERIMENTAL EXCHANGE TRANSFUSION USING PURIFIED HEPARIN

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A DESCRIPTION has already been given of experimental "exchange" transfusions between nephrectomised and normal dogs (Thalhimer 1938). Purified heparin injected intravenously as an anticoagulant prevented thrombus formation, in some experiments for many hours, and caused no toxic symptoms. The purpose of the experiments was to determine whether blood-urea could be reduced in the nephrectomised dog, and whether this non-protein nitrogenous substance which the normal dog received would be excreted rapidly. Although only a comparatively small amount of blood was exchanged in each direction, the results indicated that the study might profitably be extended, using a pump which made possible the exchange of blood at a much more rapid rate.

METHODS

Dogs (6 to 20 kg. in weight) were anæsthetised with an intravenous injection of Nembutal. Under aseptic conditions both kidneys were removed, utilising either two lumbar or a single ventral incision. The exchange transfusion experiment was performed 1–5 days after the operation.

The nephrectomised dog and a normal "donor" dog were anæsthetised with nembutal given intravenously. Occasionally, when the donor dog was in coma, it was not anæsthetised until after the transfusion had started. In each dog one carotid artery and jugular vein, or one femoral artery and vein, were exposed and cannulæ inserted. These were connected to a pump (Figs. 1 and 2) specially designed to give a volumetrically equal exchange of blood in each direction (Solandt and Robinson 1938). Samples of arterial blood were taken for analysis before starting the pump. The direction of blood-flow was from the artery of each animal into the central end of the vein of the other animal. The pump was tested before each experiment to be certain that the flow was the same in both directions. Thus no change in the blood volumes of the two animals would be produced. If the pump delivered only a slight excess in either direction, one of the animals would have been exsanguinated. The first pump used delivered three litres an hour in each direction. This pump was later made to deliver six litres in each direction. With each increase in rate of exchange of blood the rate of removal of urea from the nephrectomised animal increased. Finally, a larger and somewhat modified pump, as illustrated, was constructed. This had a capacity of at least thirty litres an hour in each direction, a volume in excess of that which either the carotid or femoral artery could deliver. These arteries, in an animal weighing about 8 kg., will, however, deliver more than 12 litres of blood an hour.

TABLE SHOWING RESULTS OF REPRESENTATIVE EXPERIMENTS

Experiment.	Weight of dogs (kg.).		Duration of exchange transfusion.	Rate of exchange (litres per hour in each direction).	Blood-urea (mg./100 c.cm.).					
					Donor.			Nephrectomised.		
	Nephrectomised.	Donor.			Before exchange transfusion.	At end of exchange.	Maximum during exchange.	Before nephrectomy.	Before exchange.	At end of exchange.
14	12	10	6	3	12	33	33	15	62	50
16	6	8	7	6	11	29	48	14	120	36
17	7	30	22	6	17	35	45	N.	206	41
18	13	23	2	6	19	45	48	,,	105	56
19	8	12	6	6	22	29	46	,,	89	33
20	15	27	6	6	18	65	65	20	224	67
21	20	21	27	12	15	20	81	13	220	20
23	8	24	4	12	17	62	62	24	211	61
25	11	18	2	12	29	68	68	26	200	82
28	10	No. 1 21	1	12	20	52	—	11	145	72
		No. 2 18	1	12	21	44	—	..	..	57

N.=normal.

Sufficient highly purified heparin (Scott and Charles 1933) was injected intravenously just before starting the pump temporarily to prevent thrombus formation. Heparin was injected subsequently either at hourly intervals or at a constant rate by means of a motor-operated piston pump. Samples of arterial blood were taken at intervals, and the urea nitrogen was determined by the method of Barrett (1935). In some experiments the urine was collected and analysed for urea nitrogen by the same method used for blood.

The nephrectomised dogs usually were killed at the end of the experiment by an overdose of nembutal. An autopsy was performed and miscroscopic examination of various organs was made. Some of the donor dogs were allowed to recover, to observe if they returned to a normal state, and to follow the urea-nitrogen content of their blood.

RESULTS AND DISCUSSION

After both kidneys have been removed from a dog, urea increases rapidly in the blood. In twenty-four hours it is usually in excess of 75 mg. of urea nitrogen per 100 c.cm. of blood, and in forty-eight hours may exceed 200 mg.

In the earlier work (Thalhimer 1938) even the exchange of comparatively small volumes of blood lowered the level of urea nitrogen in the blood of the nephrectomised dog, and increased it in the blood of the normal dog. The rate of removal of urea—i.e., diffusion into the tissues and excretion—in the normal animal was found to be rapid. However, only in the longer experiments, with more rapid exchange of blood, did urea in the normal dog, having reached a peak, begin to decrease. This happened even though blood from the nephrectomised dog, high in urea, continued to be introduced into the circulation of the normal dog. The accompanying Table and Figs. 3–5 summarise and illustrate the results of representative experiments.

It became evident that in some experiments the lowering of urea in the nephrectomised animal's blood was not proportional to the increase of urea in the blood of the normal animal. This indicated that there must be a reservoir which supplied urea to the blood during the process of its removal. The reports of other investigators have shown that equilibrium between the tissues and the blood occurs at, or about, the blood-urea level. The existence of this reservoir is indicated in some of our experiments (see No. 21) in which the donor dog excreted an amount of urea far in excess of that present in the blood of the nephrectomised dog at the beginning of the transfusion. The tissues are the obvious source of this excess. This reservoir in the donor dog must also be considered. The drop in the blood-urea of the nephrectomised dog, which occurs in the first hour of the experiment, is largely due to a dilution effect. It is probably correct to consider that, after the experiment has proceeded for a short time, the urea of the nephrectomised dog is distributed fairly evenly throughout the blood and non-osseous tissues of both animals. Once this has taken place, subsequent lowering of the urea can, of course, only be effected by excretion of this substance in the urine of the donor dog.

In some cases the exchange transfusion was started after the nephrectomised dog had become

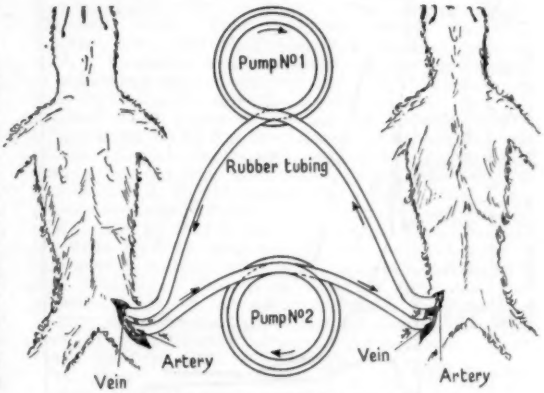

FIG. 2.—Exchange transfusion between dogs.

comatose. After a few minutes of transfusion it became conscious and then again lapsed into unconsciousness. This latter condition was thought to be due to the anæsthetic carried over in the blood of the donor. Before the nephrectomised dogs became comatose they sometimes exhibited signs of hyperexcitability. In this stage it was observed, in one instance by X ray, that the left side of the diaphragm was "beating" in synchrony with the heart. Presumably a state of hyperexcitability resulted in the left phrenic nerve, which lies in direct contact with the pericardium, being excited by the myocardial action currents. It was, in effect, a rheoscopic nerve-muscle preparation.

Many of the experiments were completed with both animals in good condition, and with no signs of thrombus formation. The donor dogs usually made rapid and complete recoveries. The kidneys and other organs of most of the donor dogs which were sacrificed were found to be normal on macroscopic and microscopic examination. This is specially significant in Experiment 21, where the exchange transfusion was continued for twenty-seven consecutive hours and no abnormality of the donor was found at autopsy. In some experiments accidents occurred which were due to avoidable causes, such as thrombosis from insufficient heparin, mechanical accidents to the early models of the pump, and incompatibility of bloods.

In most of the experiments only a single donor animal was used for each transfusion. When this was so no incompatibility of the bloods of the nephrectomised and donor animals was encountered. It is well known that isoagglutinins and isohæmolysins occur in dogs, and we were on the watch for incompatibility reactions. Unlike humans, dogs do not have definite blood groups, and agglutinins and hæmolysins are present in only some dogs. When they exist they usually agglutinate

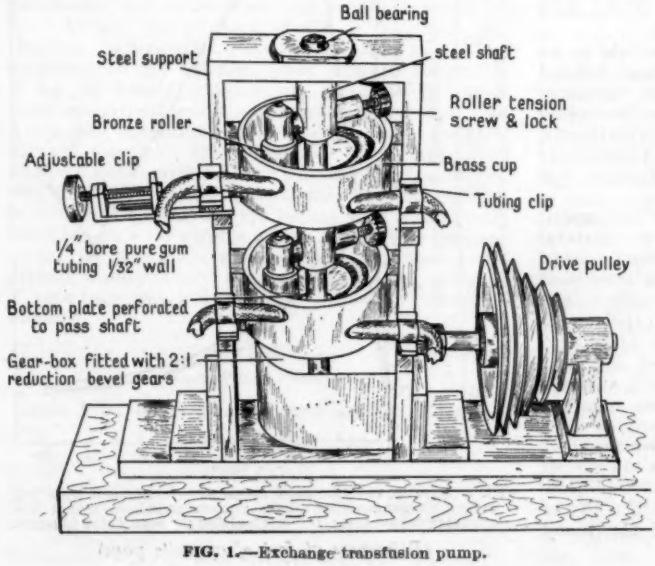

FIG. 1.—Exchange transfusion pump.

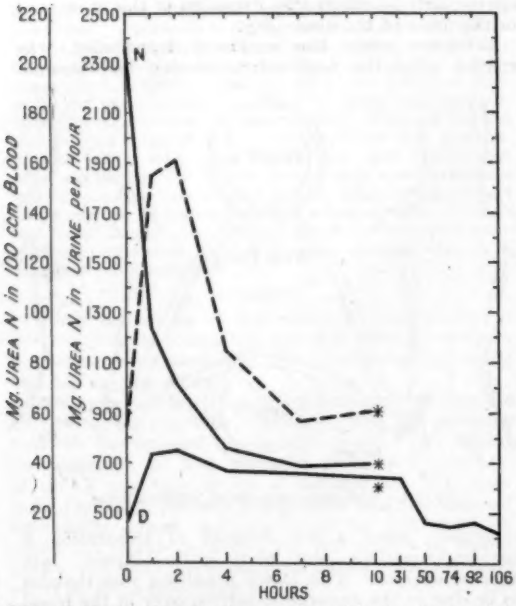

FIG. 3 (Expt. 17).—Continuous line = blood; interrupted line = urine; N = nephrectomised dog; D = normal dog; * = end of exchange transfusion.

and hæmolyse the red blood-cells of many other dogs.

It was only when the experiments were extended by the use of two or three donor dogs in succession that the phenomena of blood incompatibility were encountered. Multiple donors were used in an attempt to speed up the removal of urea from the nephrectomised dog in the hope that the urea could be reduced to a normal level in two or three hours. With two compatible donors, used in succession for one hour each, as in Experiment 28, the urea was removed from the nephrectomised dogs more rapidly than when only one was used. In two experiments a third donor was used at the beginning of the third hour, but each time an accident occurred.

The only previous publication in this field is by Nyiri (1926) and is entitled Experimental Crossed Transfusions in Uræmia. Experimental exchange transfusions for other purposes have been performed by many workers but, as in Nyiri's experiments, exchange of blood was slow and no method of ensuring movement of equal volumes in each direction was used.

Nyiri described "crossed transfusions" in experimental uræmia in dogs caused by bilateral nephrectomy or by administering uranium nitrate. He did not employ an anticoagulant, but attempted to prevent thrombosis by the use of paraffin-coated cannulæ. He was able to carry on several experiments for periods of two or three hours. The blood-urea nitrogen decreased in the nephrectomised dog, and increased in the donor dog, but the uræmic animal's blood-urea was not reduced below 150 mg. per 100 c.cm. from a level of 250–300 mg.

There are perhaps some circumstances which might justify the use of exchange transfusions in the human species. However, application to human subjects should be considered only after a thorough study of the technique and full appreciation of the many attendant dangers.

SUMMARY

These experiments demonstrate that with the use of purified heparin and a specially designed pump, short-term or long-term exchange transfusions can be carried out safely between two anæsthetised dogs. The heparin does not have any toxic action. If it is used continuously and in sufficient amounts thrombosis can be prevented.

The urea which has accumulated in blood and tissues of a dog after bilateral nephrectomy is excreted rapidly in the urine of the normal donor. The excretion is sufficiently rapid to lower the urea—which for a time is greatly increased in the donor animal—to approximately normal values in 12–18 hours. When the transfusion is discontinued the donor dog may recover completely and behave in an entirely normal manner. At various intervals later, the tissues, including the kidneys, of the dogs used as donors in the successful experiments were found to be normal macroscopically and microscopically.

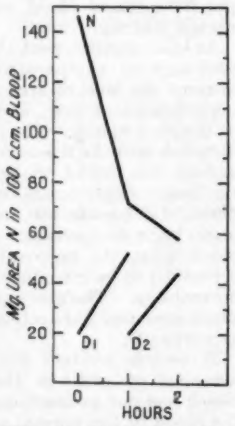

FIG. 5 (Expt. 28).—N = nephrectomised dog; D_1 = first normal dog; D_2 = second normal dog.

We would like to acknowledge help received from various colleagues both in New York and in Toronto. This work has been supported by the New York, Nathan Hofheimer, and Friedsam Foundations and by the Connaught Laboratories.

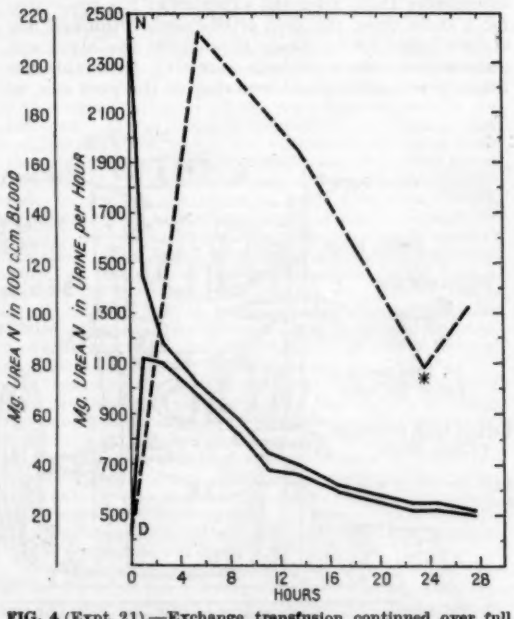

FIG. 4 (Expt. 21).—Exchange transfusion continued over full period. Continuous line = blood; interrupted line = urine; N = nephrectomised dog; D = normal dog; * = catheter plugged.

(*References at foot of opposite page*)

THE USE OF SYNTHETIC DESOXYCORTICOSTERONE ACETATE IN ADDISON'S DISEASE

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Until recently cortical extract, available for therapeutic purposes, has been prepared from the adrenal glands of cattle, and the disadvantages have been the instability and the large quantities necessary to maintain patients with severe adrenal insufficiency. Kendall and co-workers in America, and Reichstein of Zürich (with collaborators) have obtained several crystalline fractions from these cortical extracts, one or more proving potent when tested on adrenalectomised rats and dogs. Steiger and Reichstein (1937) finally reported that the essential constituent was a substance, which they termed corticosterone, and which had a formula $C_{21}H_{28-30}O_4$, the structural formula being shown in Fig. 1*a*. This appeared to be identical with Substance B of Kendall (1937). De Fremery, Laqueur, Reichstein, Spanhoff, and Uyldert found that the daily maintenance dose of corticosterone for an adrenalectomised rat was 0·5 to 1·0 mg., and for an adrenalectomised dog (having salt in addition) 1·5 mg. Similar values were found to be effective for Compound B by Kendall, Mason, Hoehn, and McKenzie.

Steiger and Reichstein then successfully synthesised from stigmasterol a substance, which they called desoxycorticosterone, and whose formula (see Fig. 1*b*) only differs from that of corticosterone in so far as the hydroxyl group in the nucleus is missing. It proved effective in adrenalectomised dogs and rats, and they state that "the activity is not less than one-third of corticosterone."

Desoxycorticosterone acetate prepared by Reichstein and co-workers was kindly supplied to me through the courtesy of Dr. A. Macbeth and Organon Laboratories. It was prepared in 1 c.cm. ampoules of oily solution, each ampoule containing 6 mg. of desoxycorticosterone acetate. Biological tests on adrenalectomised animals suggested that 6 mg. was equivalent to 75 to 150 c.cm. of cortical extract (cortin). The results of therapeutic trial on two patients with Addison's disease are given below. The first with severe adrenal insufficiency gave an equivocal response, but the second was undoubtedly benefited to a far greater degree than when receiving cortin (in a certain dosage). The injections were given intramuscularly, and were not painful, although a transient localised stinging sensation sometimes resulted.

(*Continued from previous page*)

DRS. THALHIMER AND SOLANDT AND PROF. BEST

REFERENCES

Barrett, J. F. (1935) *Biochem. J.* **29**, 2442.
Nyiri, W. (1926) *Arch. exp. Path. Pharmak.* **116**, 117.
Scott, D. A., and Charles, A. F. (1933) *J. biol. Chem.* **102**, 437.
Solandt, D. Y., and Robinson, F. L. (1938) *J. sci. Instrum.* **15** (in the press).
Thalhimer, W. (1938) *Proc. Soc. exp. Biol., N.Y.* **37**, 641.

TWO CASE RECORDS

Case 1.—Mrs. A, aged 42, with four daughters (youngest aged 13), became ill early in 1934, and the diagnosis of Addison's disease was made at Ruthin Castle, tentatively in June, 1934, and finally in January, 1935. The symptoms were tiredness, malaise, and anorexia; pigmentation was present, with a tendency to leucodermic pattern (as in one of Addison's original cases), and the blood pressure was 95/75. Although the family history and the occurrence of lupus at the age of 13 suggested a tuberculous basis for the disorder, no calcification of the adrenal glands was seen in the radiograms. The patient has been under my care (with the coöperation of Dr. J. V. Buchanan) since June, 1935. Her requirements at that time were 5 c.cm. of cortin daily, and at the present moment 20 c.cm. of cortin daily together with 16 grammes of salt, or preferably a mixture of sodium citrate, bicarbonate, phosphate, and sulphate. One must therefore assume a progressive lesion of the adrenal glands. The patient is very sensitive to a reduction of dosage of cortin, and her symptomatic indications have always constituted the best guide as to adequate therapy.

In March, 1937, even 20 c.cm. of cortin daily appeared insufficient to maintain good health, and it was decided to attempt grafting of the adrenal gland of a stillborn fœtus into the rectus sheath. This was carried out in April, 1937, by Mr. Hamilton Bailey, who had previous experience of the technique. The graft appeared to function, the patient feeling in excellent condition on 6 c.cm. of cortin daily together with salt, instead of the previous dose of 20 c.cm.

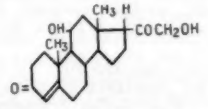

FIG. 1a.—Corticosterone.

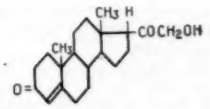

FIG. 1b.—Desoxycorticosterone.

However, after three months the effect of the graft appeared to wear off, and there has been a gradual increase in dosage of cortin until 20 c.cm. daily was again necessary in March, 1938. A low-potassium diet was also given with some benefit, but no appreciable reduction of cortin was thereby permitted.

Although the patient lived in the country, she seemed a suitable case for trying desoxycorticosterone. The last dose of cortin and of salt was given at 9 A.M. on May 11th. From May 13th to 21st the patient was given 0·5 c.cm. (3 mg.) of desoxycorticosterone, because at that time it was thought to be equivalent to 30 c.cm. of cortin. There was a gradual deterioration in her condition, weakness, irritability, nausea, and a sensitivity to cold developing. The pulse became rapid, and somewhat irregular, and the systolic blood pressure had fallen from 120 to 110. On the afternoon of May 21st, she was given 2 c.cm. of desoxycorticosterone acetate (12 mg.) and this was followed in ten minutes by a partial collapse with feeble pulse, but there was then progressive improvement. From May 22nd to 25th she received 1 c.cm. of corticosterone acetate (6 mg.) twice daily, and her general condition was reasonably good, but she was not as well as on cortin and salt; she was under the definite impression that desoxycorticosterone acted much more rapidly than cortin, but its action did not last as long, the maximum effect wearing off in a few hours. On the 25th and 26th she had 1 c.cm. of corticosterone acetate daily, and her salt mixture. Her condition improved slightly. On May 27th she returned to cortin, 20 c.cm. daily together with the salt mixture. There was an almost immediate improvement in her condition, and after a few days she was feeling as well as ever. The blood pressure throughout had remained between 115 and 120 mm. of mercury, except for a transitory fall to 110 on May 21st.

The blood chemistry was kindly investigated by Dr. E. N. Allott, and, in spite of the patient's poor clinical condition at one period, showed no adverse change. Thus, on May 13th, the serum sodium was 307, the serum chloride 365, and the blood-urea 18 mg. per 100 c.cm.; on May 16th the figures were 307, 352, and 28 respectively, and on May 21st 322, 368, and 22.

It is not easy to come to any definite conclusion on this case, but one might say that desoxycorticosterone acetate was potent and could replace cortin to some extent; 6 mg. of desoxycorticosterone acetate did not appear to be as efficacious clinically as 20 c.cm. of cortin but sufficed to prevent the blood chemistry from showing any gross change.

CASE 2.—The patient was a man aged 24. He had had vague symptoms since 1932, but collapsed in November, 1934, and Addison's disease was diagnosed in Hong-Kong Naval Hospital. His blood pressure was then 78/52, and the pigmentation typical. He made excellent response to salt therapy, and was able to return to London, where he was seen by me. On 12 g. of salt daily together with 5 c.cm. of cortin every other day, he maintained fair health; but malaise, nausea, and weakness returned at the beginning of this year, and cortin was increased to 5 c.cm. daily with immediate improvement in all symptoms. On June 21st, 1938, his blood pressure was 100/60, and his weight naked 9 st., at which level it had been fairly constant for some months. The 5 c.cm. cortin was replaced by 1 c.cm. (6 mg.) of desoxycorticosterone acetate on June 22nd. There was an almost immediate gain in strength and well-being and a progressive increase in weight, so that on July 6th his naked weight was 10 st., a gain of 14 lb. in as many days.

The blood pressure had risen to 115/70. In the next few days, however, he contracted a cold, and lost 4 lb. in weight. The latter remained fairly constant (9 st. 10 lb.) up to July 17th, when desoxycorticosterone acetate was again replaced by cortin. There was then a gradual deterioration in his clinical condition, and a progressive loss of weight, so that on July 26th he weighed only 9 st. 1 lb. Salt therapy was unchanged throughout. Dr. Allott kindly investigated the blood chemistry on June 21st and July 6th. There was an improvement in the serum sodium from 296 to 309 mg. per 100 c.cm.; the serum chlorides were the same, 376, and 374, and the blood-urea fell from 36 to 24 mg.

It appears obvious in this case that desoxycorticosterone was potent, and that 1 c.cm. or 6 mg. of desoxycorticosterone was of far greater benefit than 5 c.cm. of cortin. It appears also that it provided complete replacement therapy when used in conjunction with salt.

CONCLUSION

A synthetic product, desoxycorticosterone acetate, approximating in chemical formula to corticosterone, was found effective in two patients with Addison's disease.

It has a therapeutic action in Addison's disease similar to that of extract of the suprarenal cortex (cortin). From the cases recorded it appears that 6 mg. of desoxycorticosterone acetate (1 c.cm. of oily solution) is equivalent to more than 5 c.cm. but less than 20 c.cm., of cortin.

REFERENCES

de Fremery, P., Laqueur, E., Reichstein, T., Spanhoff, R. W., and Uyldert, I. E. (1937) *Nature, Lond.* **139**, 26.
Kendall, E. C., Mason, H. L., and Myers, C. S. (1936) *Proc. Mayo Clin.* **11**, 337.
— — Hoehn, W. M., and McKenzie, B. F. (1937) *Ibid*, **12**, 136.
— — — — (1937) *Trans. Ass. Amer. Phys.* **52**, 123.
Reichstein, T. (1936) *Helv. chim. Acta*, **19**, 29, 1107.
Steiger, M., and Reichstein, T. (1937) *Nature, Lond.* **139**, 926.

ACUTE ULCERATIVE STOMATITIS

BY E. WILFRED FISH, M.D. Manch., D.D.Sc. Melb., D.Sc. Lond.

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AN individual attack of Vincent's angina or acute ulcerative stomatitis will generally yield to local treatment, though even so when the usual methods are employed it may sometimes prove obstinate. The real problem, however, is to prevent recurrent attacks of the disease with the associated misery, ill health, and ultimate loss of the teeth. A new method of treating these cases is here suggested which not only controls the disease immediately but enables one to maintain control until certain measures, which are also outlined for the prevention of future attacks, have been instituted.

SYMPTOMS AND PATHOLOGY

Vincent's angina is the commonest acute form of marginal gingivitis. It is sometimes associated with ulceration of the tonsils and pharynx, cheek, and even tongue, but such extension is comparatively rare and the usual manifestation of the disease is confined to the gum margins. In a severe attack the patient complains of great discomfort especially on eating. Food which is hard or acid or highly spiced is quite impossible and even between meals there is considerable distress. Sleep is disturbed and the temperature may sometimes be raised a degree or two. The gums bleed at the slightest touch and the breath is fœtid.

On examination the teeth are often found to be stained and covered with soft debris since cleaning them is almost impossible. The edges of the gums are a deep red and in an established case the actual margin is green and necrotic with the slough firmly adherent. The inflammatory zone below the slough is, however, narrow and rapidly passes into an area of comparative normality. It is rare to find any great swelling of the surrounding tissues, but the edges of the gum are excavated, ragged, and detached from the teeth. In an early case only the tips of the interdental papillæ may be gangrenous but in a week or two, unless energetic treatment is instituted, the whole papilla may be destroyed and the entire gum margin covered with the green slough. Alternatively the symptoms may abate spontaneously only to be followed by further attacks every few months.

The differential diagnosis from scurvy is based on the history and associated symptoms of the latter disease, from mercurial poisoning on the history, and from erythema multiforme on the gangrenous appearance of the surface of the lesions and their distribution. In erythema the ulceration is more persistent, less destructive, and spreads over the labial aspect of the gums.

The disease is most common in young people and especially in young men. It does not appear to be infectious in the ordinary way, but I have seen a husband and wife affected at the same time. The organisms commonly regarded as causal are *Bacillus fusiformis* and *Treponema vincenti*. These are certainly very much increased in numbers but they are regularly found also in stagnant areas of most adult mouths, while the other mouth organisms are also increased in number in cases of Vincent's angina.

Despite this uncertainty as to the actual identity of the organism its effect on the tissues is charac-

teristic and sheds considerable light on its propensities. For instance, its response to surface disinfectants, and particularly to the antiseptic surface dressing about to be described, indicates that it is confined to the tissues actually undergoing ulceration at the surface, and that, as is the case with the streptococci in chronic pyorrhœa, it does not penetrate into the deeper tissues. This is borne out by the fact that if it is pushed into the deeper tissues by the extraction of a tooth during an acute attack extensive bone necrosis is very liable to occur. This bone necrosis is a very much more serious matter than the purely surface necrosis of the gum margins observed when the diseased tissues are not disturbed, and of course tooth extraction during the acute phase is most definitely contra-indicated.

The slight temperature which is often observed in the acute stage indicates that some general toxic absorption is taking place. The relative absence of local swelling and pus and the narrowness of the red inflammatory zone suggest that the organisms exert negative chemiotaxis on the leucocytes and indeed a rapidly spreading case reminds one of cancrum oris. The surface necrosis extends so rapidly and the organisms destroy and liquefy the fibrous tissue forming the muco-periosteum of the gum margins so completely that either they are highly fibrolytic themselves or they are capable of fibrolysis in conjunction with other mouth bacteria. They sometimes destroy so much tissue at the surface that after healing the case presents the same appearance as is seen after gingivectomy.

The pathology of Vincent's disease therefore offers a marked contrast to that of pyorrhœa. In pyorrhœa the organisms are also confined to the ulcerating surface in the pocket (Fish and Maclean 1936), but it is the constant seepage of their soluble toxic products into the deeper tissues which destroys the fibrous attachment of the tooth and forms a pocket. In Vincent's angina, on the other hand, the fibrolytic organisms themselves disintegrate the tissue with which they are in actual contact and there are no pockets, not because the periodontal membrane is not destroyed, but because the actual muco-periosteum of the gum margin, which would form the wall of the pocket, is also entirely eaten away, so that a ragged excavated surface covered with a greenish exudate exposes perhaps half the root of the tooth to view. Alternatively, of course, after repeated attacks the disease may become quite chronic and appear as an ordinary case of dirt pyorrhœa.

TREATMENT

Having assumed for the purpose of clinical experiment that the organisms are confined to the surface slough whence they rapidly destroy the subjacent living cells, a more energetic attempt has been made to attack them by covering them and the gum margins also with a persistent disinfectant which could be kept in position for some days. This was accomplished, and the affected tissues were protected and rested by using zinc oxide mixed into a paste with Eugenol or oil of cloves (which has a Rideal-Walker coefficient of 8). Wisps of cotton-wool are saturated with the mixture and tucked into the interdental spaces with the utmost gentleness, particular care being taken to introduce them between the loose gum margins and the teeth. It is of the first importance that the dressing be carried into the parodontal sulcus all round every tooth but it must be done without pressure and without causing pain. More wisps are spread over the first and pressed gently into place with a moist swab and smoothed over with a gloved finger. The mixture rapidly sets in the presence of moisture and forms a light cement casing or splint over the gum margins.

The result has proved very satisfactory. Within a few hours at most all pain and distress ceases, often the relief is immediate, and the patient can at once resume normal diet. When the dressing is removed forty-eight hours later, the whole gum margin is a delicate pink colour and entirely free from slough, acute inflammation, or undue tenderness. It has been thought advisable, however, in most cases to repeat the dressing for a further four days before instituting the more energetic after-treatment.

This after-care is all important if future attacks and chronic pyorrhœa are to be prevented. It consists in applying daily friction to the epithelium covering the gum margins, in order to develop on it a firm keratinous covering. Healthy gum margin normally presents a keratinous surface layer which blends with the cementum of the tooth and is completely effective in preventing the seepage of soluble toxic matter into the underlying connective tissue where it would set up chronic inflammatory changes. It is therefore most important to preserve or reconstitute this horny layer.

It is, of course, a matter of common experience that a keratinised epithelium becomes more firmly keratinised the more it is rubbed, as in the case of the hands and feet. In dealing with the gums it is necessary that this friction be applied to the epithelium right up to its point of attachment to the cementum of the tooth itself. Moreover it must be carried out all round each tooth, that is interstitially as well as labially and lingually. Naturally this rubbing must be done by the patient himself and the most useful instruments are a soft badger-hair tooth-brush for the labial and lingual edges of the gum and thin wooden tooth-picks for rubbing the gum margin between the teeth. It is no good giving a patient a hard brush and telling him to rub his gums with it if they are tender; and even in healthy mouths the chief danger of the extremely hard brush is that either it tears the gum instead of hardening it or else it hurts too much and the gums are never brushed at all.

After the first week or two the badger-hair brush may be replaced by an ordinary soft bristle brush, but the use of wood points between the teeth must be continued as a permanent habit once daily. The wooden tooth-pick * is not, of course, used to pick the teeth, but should be thin enough to slide easily between the teeth and is worked in and out with free easy strokes like a fiddle bow, so that the gum margin is firmly and gently rubbed, replacing in fact the firm friction which coarse savage food would have applied.

Thorough scaling and the polishing of all cervical margins of fillings is, of course, an essential preliminary to this rubbing, and it is generally necessary for the dental surgeon to go over the ground with a wood point and show the patient in the mirror how to do it. It may be necessary even for young patients to rub the thin wood points thinner still on sand-paper before use.

If the disease was arrested at the beginning there may still be loose gum tags or pockets, in which case the spaces should be repacked for a further week after all inflammation has disappeared when any free gum margin must be cut away under local anæsthesia. After this small operation the spaces are once again packed with zinc oxide and oil of

* These wood tooth-picks and also a softer variety impregnated with antiseptics can be obtained through Messrs. Boots.

cloves mixture until in the course of a further week or so the gum has healed sufficiently to permit the effective use of wood points.

Partially erupted third molars must, of course, ultimately be removed since the pockets round them cannot be cut away or even kept clean and hard, but it is most important to prepare the field of operation. Wisps of cotton-wool soaked in the zinc oxide and eugenol paste should be tucked gently under the loose gum flaps of the wisdom teeth and changed several times at intervals of two or three days before undertaking the extraction of the teeth, otherwise there may be a serious flare-up followed by bone necrosis.

The same precaution must be taken in the case of any other tooth which it may be found necessary to extract for a patient who has recently had acute marginal gingivitis. The extraction should be delayed until the packing has rendered the gum margin healthy, and the added precaution of sterilising the parodontal sulcus with the actual cautery immediately before extraction will preclude any possibility of the occurrence of bone necrosis or other serious septic sequelæ (Fish 1937).

If the extraction is delayed until the gums are perfectly pink, clean, and normal in appearance, free from exudate and no longer tender, there is no objection to using local anæsthesia, since, whatever may be the case during an acute attack, it has been shown conclusively that in the absence of acute inflammation the deep tissues are always sterile (Fish and Maclean 1936). (It is of course assumed that the needle will be passed through the flame, as it always should be, between punctures.) The great advantage of local anæsthesia is that it is possible to sterilise the parodontal pocket with the actual cautery more effectively than is convenient under nitrous oxide anæsthesia. The cautery should be passed slowly all round the tooth, touching the bottom of the pocket everywhere and leaving a white coagulated gum margin round the neck of the tooth to be extracted. Local bone necrosis (dry socket) has never been observed when this precaution has been taken either in post-Vincent extractions or indeed in any others (Fish 1937).

The successful sterilising effect of the zinc oxide and oil of cloves dressing on the gingival tissues is perhaps an indication of the superficial habitat of the infecting organism, but certainly the possibility of holding an antiseptic of such strength continuously and safely in contact with the gum margin is a valuable weapon in fighting any acute infective condition of the gums whether of the Vincent type or frankly streptococcal. Its effect is a striking demonstration of the accessibility and tractability of oral infection.

A further use for this packing treatment is in patients with oral sepsis who are also suffering from endocarditis. In such cases a bacterial shower into the blood stream might prove fatal by infecting the vegetations on the heart valves. Unfortunately not only will such a shower occur if the teeth are extracted (Okell and Elliott 1935) but even chewing hard food will produce it (Round et al. 1936). Careful packing of the gum margins with this paste, however, will both prevent the bacterial shower and will also clear up the toxic absorption from the gum margins which may be a factor in the causation of the disease.

SUMMARY

The symptoms and pathology of acute ulcerative stomatitis are discussed. This condition may be treated satisfactorily by packing the gum margins with a paste of zinc oxide and oil of cloves. To avoid recurrence continuous after-care should be carried out by the patient and a routine procedure adopted.

REFERENCES

Fish, E. W. (1937) *Proc. R. Soc. Med.* **30**, 1149.
— and Maclean, I. (1936) *Brit. dent. J.* **61**, 336.
Okell, C. C., and Elliott, S. D. (1935) *Lancet*, **2**, 869.
Round, H., Kirkpatrick, H. J. R., and Hails, C. G. (1936) *Proc. R. Soc. Med.* **29**, 1552.

HYPERPLASTIC TUBERCULOSIS OF THE CÆCUM

WITH SPECIAL REFERENCE TO THE RADIOLOGICAL DIAGNOSIS

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TUBERCULOSIS of the cæcum may be divided into the following types:—

Primary ulceration of the mucous membrane: seen especially in children and associated with a secondary infection of the mesenteric glands.

Secondary ulceration of the mucous membrane: in patients with tuberculosis of the lungs and more common in adults.

Chronic hyperplastic disease: a rare and atypical form.

In this paper the last type only will be discussed.

The comparative rarity of the disease is shown by figures given by Maxwell (1936) in a recent paper. In 8087 routine post-mortem examinations carried out at St. Bartholomew's Hospital and the Royal Chest Hospital, there were only two cases of hyperplastic intestinal tuberculosis.

Lockhart-Mummery (1923) in his review of 100 cases confirms that the cæcum is as a rule the site of the lesion. He also suggests that in most instances hyperplastic disease is a primary tuberculous lesion. In only 24 of his cases was a tuberculous lesion found elsewhere in the body.

The 6 cases described in this article occurred in a series of 88 consecutive patients admitted to the Black Notley Sanatorium suffering from various forms of abdominal tuberculosis. Lesions of the urinary tract were excluded. The pathology has been described by Lockhart-Mummery and others who report the important fact that ulceration of the mucous membrane is not usually present. This is atypical of tuberculosis of the intestine. Theoretically it is possible to regard hyperplastic tuberculosis of the cæcum as a primary form of disease arising by direct infection through the mucous membrane. If this is so it is difficult to see why the hyperplastic form does not also occur in connexion with open tuberculous lesions.

CLINICAL COURSE

The 6 patients in this series were all females, 2 being children and 4 adults. The chief initial symptom in each case was diarrhœa—2 of the patients had been treated for colitis for a considerable time. Colicky pain was also a pronounced symptom though no signs of obstruction developed. There was progressive loss of weight and slight fever.

On examination a palpable tumour corresponding in position and shape to the cæcum could be felt in the right iliac fossa which was slightly movable. There was slight tenderness on palpation.

As the disease progressed a localised peritonitis developed and in one patient the tumour became fixed in the midline of the abdomen below the umbilicus. Neighbouring coils of the small intestine became adherent to the mass and finally sinuses and fæcal fistulas developed. The condition of the patient gradually deteriorated. No tuberculous lesions developed in other parts of the body in any of the patients.

DIAGNOSIS

The radiological appearances as well as the clinical examination reveal the presence of a tumour in the region of the cæcum, and it is unfortunately often difficult to distinguish between three diseases that may cause a palpable tumour in this region—carcinoma of the cæcum, hyperplastic tuberculosis, and the more recently discovered Crohn's disease (regional ileitis).

The latter is a rare condition first described by Crohn, Ginzburg, and Oppenheim in 1932, which is characterised by many of the symptoms which we have already noted in hyperplastic tuberculosis—i.e., a gradual onset of abdominal symptoms with diarrhœa and a palpable tumour in the right iliac fossa. Fever and wasting are present in the later stages. Pathologically it is marked by inflammatory changes in the mucosa and submucosa and spreading through the wall of the intestine. Fibrotic changes and giant-cell formation resembling tuberculosis are present. Much stenosis results. The regional lymphatic glands are enlarged. Tubercle bacilli have not, however, been found, and caseation has not been seen. There is no evidence of tuberculosis in other parts of the body. The condition is differentiated from tuberculosis of the cæcum by the absence of tubercle bacilli and caseation, and by the more marked stenosis and obstruction. The disease also commences in the ileum and involves the cæcum later.

These criteria, however, seem to be of doubtful value in assessing whether a condition is one of low grade tuberculosis or not. Thus forms of synovial tuberculosis of the hip are seen in which there is no caseation and tubercle bacilli are not found. Often they may not be found even in tuberculous pus, and tuberculous ascitic fluid from the abdomen is often negative on guinea-pig inoculation. In addition synovial tuberculosis may be present which does not proceed to caseation in spite of the fact that tubercle bacilli may be recovered elsewhere in the body.

Both tuberculosis of the cæcum and Crohn's disease are associated with enlargement of the mesenteric glands. It is important, therefore, when enlarged mesenteric glands are discovered at laparotomy to examine the cæcum for evidence of incipient thickening.

The diagnosis from carcinoma of the cæcum is often difficult to make except by exploratory laparotomy. The radiological appearances are often identical. Tuberculosis occurs as a rule at an earlier age.

TREATMENT

It has been mentioned above that the pathology of tuberculosis of the cæcum is atypical. It is not surprising therefore to find that treatment of the disease on orthodox lines may not meet with the success obtained with other forms of tuberculous disease—by orthodox treatment is meant prolonged rest both general and local under open-air conditions. The clinician must decide whether medical or surgical treatment is required. If the latter, operation should not be delayed until the mass has become fixed and fistulæ have formed. In this series conservative treatment failed in 3 of the 6 cases—they might have benefited by early operation—but it cured 2 cases. The sixth case is doing well and operation has been postponed because of recent great improvement.

RADIOGRAPHY

In the present series of cases the patients were examined by means of a barium meal using the barium magnesium-sulphate technique (Wood 1935). This method has the advantages of outlining the cæcum, the part of the large bowel most often affected, and also the appendix unless it is occluded by the presence of disease. Serial radiograms should be taken beginning three hours after the ingestion of the meal and continued until the cæcum and ascending colon are empty. The constant deformity at the site of the lesion is well shown by this method, and its presence can be confirmed by means of a barium enema. It is advisable to take radiograms an hour after evacuation as well as pictures showing the bowel filled with the opaque medium.

The appearances are those of a tumour of the large bowel, but it is not always possible radiologically to distinguish between hypertrophic tuberculosis and neoplasm.

Fig. 1 shows the appearances found in a man aged 38, thought on clinical and radiological grounds to be suffering from hyperplastic tuberculosis of the cæcum. A filling defect is present in the cæcum and the appearances are very similar to those in the other cases described. An autopsy, however, disclosed the presence of carcinoma of the cæcum.

The appendix was not filled in any of our cases and it appears probable that this may help sometimes in the differential diagnosis. Where it does fill, a neoplasm may be suspected. Fig. 2 is an example of such a case in which the presence of carcinoma was disclosed by operation. The lumen of the cæcum is obliterated except at its lower part by the neoplasm. The appendix fills normally.

The radiological appearances of Crohn's disease may closely resemble hypertrophic tuberculosis if the cæcum is affected, but we have not observed Kantor's string sign, nor has the obstruction been sufficient to produce multiple fluid levels in a radiogram of the abdomen without barium. The appearances seen in Fig. 3 resemble very closely those described as present in regional ileitis. The terminal coil of the ileum is, however, more dilated and less "string like" in appearance (Hansson 1937).

CASE REPORTS

CASE 1.—A poorly nourished child aged 11. Strong family history of tuberculosis (three aunts and one great uncle died of phthisis). She was admitted to the sanatorium with a history of abdominal pain of acute onset and subsequent diarrhœa with constipation and vomiting at times. An ill-defined and slightly tender mass was present in the right iliac fossa. During the course of her treatment tubercle bacilli were found once in the urine and twice in the fæces.

Radiography.—Chest normal. The large intestine was examined by the barium magnesium-sulphate technique. Appearances at 5 hours are shown in Fig. 3. A small residue is present in the stomach. The cæcum is contracted and irregular in appearance, the lumen consisting of a narrow channel. The last part of the ileum and the iliocæcal junction are clearly seen. The descending colon is spastic and contains only a small quantity of barium. The deformity of

FIG. 1.—Filling defect in cæcum in a man aged 38. Autopsy disclosed carcinoma of cæcum.

FIG. 2.—Appearance six hours after a barium meal suggestive of neoplasm. A filling defect is present in the cæcum. The appendix fills normally. (Diagnosis confirmed by operation.)

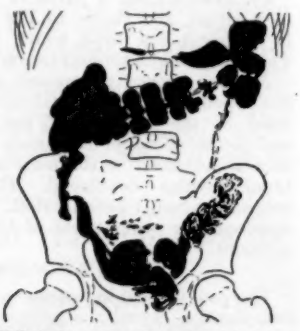

FIG. 3 (Case 1).—Hypertrophic tuberculosis of cæcum with appearances resembling those of regional ileitis.

the cæcum remained constant throughout the examination.

Result.—Constitutional measures were adopted but the patient's condition gradually deteriorated. She died two years after the onset of the illness.

CASE 2.—A woman aged 26. Operation for rectal abscess in 1931. Pains in the abdomen first began in 1933 and were accompanied by attacks of diarrhœa. In June, 1934, the abdomen began to swell and tuberculous peritonitis was suspected. Laparotomy revealed free fluid and a large mass of ileocæcal tuberculous glands. The cæcum was not obviously involved and the appendix and Fallopian tubes appeared normal. She returned to work in February, 1935. She was admitted to the sanatorium in May, 1935, when a large hard mass could be palpated in the right iliac fossa with surrounding induration. There was no fluctuation. The muscles in the neighbourhood were rigid. The patient was febrile. Triboulet's test was positive and von Pirquet's weak positive. The fæces were negative for tuberculosis. Radiography of the chest was negative. The case was first accepted as one of uncomplicated tuberculous adenitis, but since normal progress was not made, cæcal involvement was suspected.

Radiography.—A preliminary radiogram of the abdomen showed calcified glands in the lower lumbar region. By a barium enema (September, 1935, Fig. 4) the lower part of the pelvic colon was seen to be narrow and contracted. The descending colon, splenic flexure, and transverse colon were moderately dilated, but otherwise normal in outline. The cæcum showed an obvious filling defect that remained constant. In a control examination (November, 1936), using the barium magnesium-sulphate technique, the rate of passage of the meal was abnormally rapid and at three hours the barium had already reached the rectum. The filling defect at the region of the cæcum is clearly shown in Fig. 5. It will be seen that the ascending colon is narrow and contracted and that there is an area of spasm at the proximal part of the transverse colon. A gross filling defect is present in the distal part of the transverse colon which may be caused by a fæcal mass. At 6 hours and 11 hours very similar pictures were obtained. It appeared probable from this examination that there was gross involvement of the cæcum and some disease in the transverse colon and pelvic colon. A second barium-meal examination (March, 1936) still showed the filling defect and spasm previously noted in the region of the cæcum and ascending colon and contracted areas were visible in the transverse colon. There was now considerable contraction of the pelvic colon both in its proximal and its distal portions.

Result.—The patient refused a second laparotomy and constitutional measures were continued with persistence. Finally as no progress was made she discharged herself to her home after eleven months' sanatorium treatment. The last report received was that her condition had deteriorated and that a sinus had formed in the right loin.

CASE 3.—A woman aged 31 had a long history of abdominal discomfort of gradual onset, with loss

FIG. 4 (Case 2).—Barium enema before evacuation.

FIG. 5 (Case 2).—Three hours after a barium meal. Compare with Fig. 4.

FIG. 6 (Case 3).—Barium enema after evacuation showing the filling defect present in the cæcum.

of weight (3 st.) and occasional vomiting. A laparotomy in April, 1935, revealed that the cæcum was the seat of tuberculosis (confirmed by microscopical examination). On admission to sanatorium in October, 1935, she was emaciated. A large tender mass was present in the right iliac fossa above Poupart's ligament. Von Pirquet's test was positive; Triboulet's was negative. The fæces were negative for tubercle bacilli.

Radiography.—Chest negative (October, 1935). Abdomen (same date): no evidence of calcified foci or other abnormality. A barium enema was given in May, 1936, and radiograms obtained before and after evacuation. The barium passed at the normal rate through the colon as far as the cæcum, where a fixed deformity was present. The remainder of the bowel appeared normal in outline. After evacuation (Fig. 6) the filling defect in the cæcum remained constant. The appearances suggested the presence of a lesion of the cæcum with occlusion of its lumen.

Result.—Constitutional measures were adopted and continued for several months, but further deterioration in the general and local condition occurred. The mass increased in size and shifted its position from the right iliac fossa to the midline below the umbilicus. Two fæcal fistulæ developed. In June, 1936, the patient was transferred to a general hospital where the mass was short-circuited by an anastomosis. She died however shortly after the operation. In this case an anastomotic operation in the early stages of the disease, with or without resection of the mass, might have given the patient a greater chance of recovery.

FIG. 7 (Case 4).—Twenty hours after a barium meal. Compare with Fig. 8.

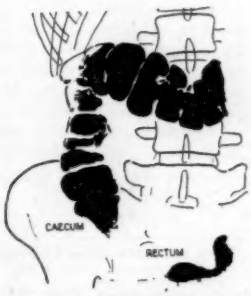

FIG. 8 (Case 4).—Barium enema after evacuation. The deformity of the cæcum noted at the barium-meal examination is still present. Compare with Fig. 7.

CASE 4.—A girl aged 18 with a history of vague ill health for three or four years, with occasional abdominal pains and alternating diarrhœa and constipation. She had amenorrhœa. There had been some loss of weight. On admission the cæcum could be felt as a thickened slightly mobile tumour in the right iliac fossa. There was some muscular rigidity and tenderness on palpation over it. The von Pirquet test was positive; Triboulet negative. The fæces were negative for tubercle bacilli.

Radiography.—Chest normal. In serial radiograms a barium meal had reached the rectum at the 14-hour examination. The cæcum was slightly contracted and irregular, the appearance remaining constant throughout the examination (Fig. 7).

A barium enema in August, 1934, confirmed these appearances. It passed without delay as far as the cæcum. The colon appeared normal, but a deformity of the cæcum was again noted which corresponded to that seen by means of meal (Fig. 8).

Result.—Constitutional measures were adopted and slow but gradual improvement, both local and general, took place. The patient was discharged at the end of a year, when the mass had almost completely resolved and the general condition had improved. Towards the end of her treatment she suffered from an attack of erythema nodosum of the right shin. This was accepted as confirmatory evidence of the diagnosis of tuberculosis. She is now back at work and remains in good health.

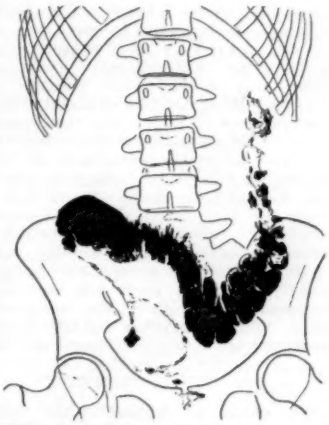

FIG. 10 (Case 6).—Eight hours after a barium meal.

CASE 5.—A child aged 5 with no family history of tuberculosis. There had been abdominal enlargement and occasional attacks of vomiting since March, 1936. On admission to hospital three pints of straw-coloured fluid were aspirated, which on inoculation into a guinea-pig proved to be positive for tuberculosis. She was transferred to this sanatorium in October, 1936. On admission ascites was present; the cæcum could be felt as a firm rounded mobile mass. The Mantoux reaction was strongly positive.

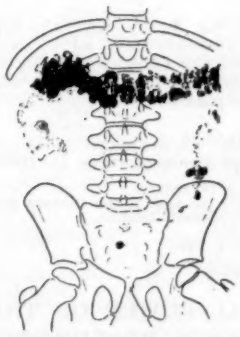

FIG. 9 (Case 5).—Twenty-one hours after a barium meal.

Radiography.—Chest normal. Abdomen: no evidence of calcified glands. A barium meal was given in November (barium magnesium-sulphate technique). Serial radiograms at 15, 21, and 45 hours showed a constant filling defect of the cæcum (Fig. 9). There was abnormally rapid emptying of the cæcum and ascending colon.

Result.—Constitutional measures were instituted and the child responded well in that there was great improvement in the general condition and rapid absorption of the ascitic fluid, with more gradual resolution of the tumour. At the end of ten months she was discharged symptom-free, and with no abnormality present in the abdomen on physical examination. Her health since discharge has remained good.

CASE 6.—A woman aged 26 with no family history of tuberculosis. There was a history of intermittent abdominal colic and diarrhœa since early in 1936. Later there was some swelling of the left ankle and right knee. A laparotomy was performed in June, 1937 (Mr. R. W. Reid). Thickening of the cæcum and terminal ileum were found. Microscopical examination of material taken at operation showed the presence of giant cells. She was readmitted to hospital later with symptoms of subacute obstruction. In September she was transferred to the sanatorium. On admission she was emaciated. There was a hard irregular and fixed swelling in the right iliac fossa. Von Pirquet positive. Fæces negative for tuberculosis.

Radiography.—No bone changes seen in the knee- or ankle-joints. Radiological examination of the

chest negative (June). By barium magnesium-sulphate technique (August) the meal passed with abnormal rapidity at first and reached the rectum in 9 hours. Subsequently progress was slower and there was considerable residue at 48 hours. A constant filling defect was noted in the cæcum (Fig. 10), the presence of which was confirmed in all the radiograms. The remainder of the large bowel was normal.

Result.—Constitutional and dietetic measures were instituted and improvement in the general condition was immediately seen. There was no change, however, for two months in the mass and symptoms persisted. Operation was considered but was postponed on account of a sudden rise of temperature to 103° F. without symptoms or signs. Defervescence rapidly occurred and was accompanied by rapid decrease in the size of the tumour in the right iliac fossa. Owing to this recent change constitutional measures are being continued at the present time.

SUMMARY

Six cases of hypertrophic tuberculosis of the cæcum are described and the radiological appearances are contrasted with those seen in new growth of the cæcum and Crohn's disease.

A correct diagnosis may sometimes be obtained by consideration of the history and radiological appearances, but frequently it is necessary to resort to a laparatomy to establish the nature of the lesion. Constitutional measures were successful in a proportion of the cases, but surgical treatment should always be considered and should not be delayed until the later stages of the disease when fistulæ have formed.

Our thanks are due to Sir Henry Gauvain and Mr. Ronald Reid for their assistance and advice, and to Dr. W. A. Bullough and the tuberculosis officers of the Essex County Council for information about the present condition of the patients.

REFERENCES

Crohn, B. B., Ginsburg, L., and Oppenheimer, G. D. (1932) *J. Amer. med. Ass.* **99**, 1323.
Hansson, C. J. (1937) *Acta radiol.* **18**, 637.
Lockhart-Mummery, J. P. (1923) Diseases of the Rectum and Colon and their Surgical Treatment, London.
Maxwell, J. (1936) *Tubercle*, **17**, 337.
Wood, F. G. (1935) *Brit. med. J.* **1**, 640.

THE ANTIBACTERIAL POWER OF THE BLOOD OF PATIENTS RECEIVING 2-(*p*-AMINOBENZENESULPHONAMIDO) PYRIDINE

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In previous experiments with 2-(*p*-aminobenzenesulphonamido) pyridine I showed that when this chemical is mixed with deleucocyted blood in concentrations which might reasonably be expected to be reached in its therapeutic use it has no bactericidal power but is strongly bacteriostatic.[1] I showed also that when mixed with defibrinated blood which has not been deprived of its leucocytes it enhances enormously the antibacterial power of the blood.

If this drug (known for short as T693 or M. & B. 693) acts by virtue of its bacteriostatic power then the blood of patients taking it should possess an increased power of restraining the growth of bacteria which are sensitive to its action. The present paper describes experiments showing that the action of the blood of patients taking T693 does not differ materially from the action of blood mixed with the chemical after withdrawal from the body.

The blood specimens used in these experiments were taken from three patients who were being treated in St. Mary's Hospital with T693. Before the experiments commenced patient A had been taking 3 g. daily for three days and Patients B and C 6 g. daily for five days—all orally. These doses were continued throughout the period covered by the experiments. The organism used as a test microbe was a hæmolytic streptococcus "Richards" which I have previously shown was very sensitive to the action of T693 in vitro. This was planted in various quantities into the blood or into the blood mixed with homologous or other serum, the implanted blood or blood-serum mixtures were incubated in slide-cells, and the number of colonies of streptococci which grew out was estimated.

ANTIBACTERIAL POWER OF WHOLE BLOOD

The blood was defibrinated and to 50 c.mm. of this was added 2·5 c.mm. of a dilution of a stock culture of *Streptococcus pyogenes* Richards. As a control to the patients' blood a normal blood (A. F.) was treated in the same manner. The results obtained are shown in Table I.

TABLE I—ANTIBACTERIAL ACTION OF THE BLOOD OF PATIENTS TAKING T693 ON *S. pyogenes*

Patient.	Dose of T693.	No. of colonies after 24 hours' incubation with implants of streptococci per cell as under—			
		114	1140	11,400	114,000
Normal control	0	4	22	∞	∞
A	3 g. daily.	0	0	3	∞
B	6 g. „	0	0	150	∞
C	6 g. „	0	0	0	0

Time of incubation = 24 hours at 37° C. ∞ = uncountable.

It is clear from this Table that the blood of all three patients had a greatly enhanced antibacterial power towards *S. pyogenes* and also that the blood of one taking the larger dose was much more potent than the others. The difference between the two patients taking 6 g. daily will be discussed later.

The increased antibacterial power of the whole blood of the patients taking T693 might be due to the increased efficiency of the leucocytes or to some antibacterial element in the serum. Experiments were therefore made to obtain further information on this point.

The corpuscles from normal blood and from the blood of Patient C, who showed the greatest anti-streptococcal power, were washed free from serum by repeated centrifugalisation in normal salt solution, and normal saline was added to bring the volume up to the volume of the original blood. Volumes of 25 c.mm. of these washed corpuscles were mixed with 25 c.mm. of serum from the different patients and 2·5 c.mm. of a suitable dilution of *S. pyogenes*. These mixtures were incubated in slide-cells and the results obtained are shown in Table II. From this Table it is clear that the serum of all three patients is more antibacterial than normal serum, and also that the serum of Patients B and C (taking 6 g. daily) is more potent than the serum of Patient A, taking 3 g. daily. With both normal and patients' corpuscles, and the serum of Patient C, there is no

[1] Fleming, A., *Lancet*, July 9th, 1938, p. 74.

growth of streptococci even with the largest implant, but with the serum of Patients A and B there is more growth in the presence of Patient C's corpuscles than with normal corpuscles, showing that the corpuscles of Patient C are less effective than are the corpuscles of an untreated man.

TABLE II—EFFECT OF MIXING WASHED BLOOD CORPUSCLES WITH NORMAL AND PATIENTS' SERUM ON *S. pyogenes*

Washed corpuscles +	Serum +	Number of colonies developing in mixtures as under—Implant of streptococcus per cell. 114	1140	11,400	114,000
Normal ..	Normal.	Almost complete hæmolysis in all.			
" ..	Patient A.	4	22	Several hundred.	∞
" ..	" B.	0	0	12	∞
" ..	" C.	0	0	0	0
Patient C	Normal.	Complete hæmolysis in all.			
	Patient A.	3	68	Almost complete hæmolysis.	
	" B.	0	0	Complete hæmolysis.	
	" C.	0	0	0	0

Time of incubation = 24 hours at 37° C.

It is clear therefore that the increased antibacterial power of the patients' blood is a virtue of the serum and is not due to an increased efficiency of the leucocytes.

On these tests the washing of the blood corpuscles entails a considerable amount of trouble, and in the process their efficiency is often impaired. It was thought that the antibacterial effect of the patients' serums might be estimated by testing them as in the last series of experiments, except that normal defibrinated blood was substituted for washed corpuscles. The mixtures then contained the same number of leucocytes as in the previous

TABLE III

Normal blood 2·5 c.mm. + serum (as under) 2·5 c.mm. { +2·5 c.mm. streptococcus dilution.

—	No. of colonies developing from implants of streptococci per cell as under— 114	1140	11,400	114,000
Normal serum ..	½ lysis.*	½ lysis.*	¾ lysis.*	¾ lysis.*
Serum of— Patient A ..	1	2	∞ small.	∞
" B ..	0	0	0	∞
" C ..	0	0	0	0

Time of incubation = 24 hours at 37° C.
* Here the areas of hæmolysis had coalesced producing hæmolysis of half or three-quarters of the total blood.

experiments with normal washed corpuscles, but there was approximately 12·5 c.mm. of normal serum instead of normal saline. Technically, this test was much easier and it avoided possible damage to the corpuscles in the process of washing. The results obtained are given in Table III.

It will be seen that, as when washed blood corpuscles were used, all the patients' serums were more antibacterial than normal and also that their potency was in the order, C, B, and A.

Normal blood must be used in such an experiment if any satisfactory reading is to be obtained, for if a patient's blood is used then some of the patient's serum will be present which may completely obscure the results. This is shown in a series of observations (Table IV) in which the blood of Patient C was used in exactly the same way as was normal blood in the last series.

Here there was sufficient serum of Patient C included in the 25 c.mm. of his blood completely to prevent the growth of streptococci whatever serum was used.

TABLE IV

Blood of Patient C 2·5 c.mm. + serum (as under) 2·5 c.mm. { +2·5 c.mm. streptococcus dilution.

—	No. of colonies developing from implant of streptococci per cell as under— 114	1140	11,400	114,000
Normal serum ..	0	0	0	0
Serum of— Patient A ..	0	0	0	0
" B ..	0	0	0	0
" C ..	0	0	0	0

Time of incubation = 24 hours at 37° C.

TITRATION OF THE ANTIBACTERIAL POWER OF THE PATIENTS' SERUM

This was done by making serial dilutions of the serum of the patient in normal salt solution and mixing 25 c.mm. of these dilutions with 2·5 c.mm. of streptococcus culture and 25 c.mm. of normal defibrinated or deleucocyted blood. These mixtures were incubated in slide-cells. There is no real difference between the results obtained with blood with and without leucocytes, except that when leucocytes are present the

TABLE V—TITRATION OF THE ANTIBACTERIAL POWER OF SERUM OF PATIENTS TAKING T693

Normal blood.	No. of colonies developing in mixtures as under— Defibrinated.	Defibrinated.	Deleucocyted.
Implant of streptococci	274	1150	115
Serum used ..	Patient C.	Patient B.	Patient B.
Dilution of serum— 1/1 ..	0	0	0
1/2 ..	0	0	10
1/4 ..	1	8	70 discrete areas of hæmolysis.
1/8 ..	—	16	73 discrete areas of hæmolysis.
1/16 ..	—	28	109 discrete areas of hæmolysis.
1/32 ..	—	Almost complete hæmolysis.	Complete hæmolysis.
Control— Normal saline .	Complete hæmolysis.	Ditto.	Ditto.
Control— Normal serum .	—	Ditto.	Ditto.

Time of incubation = 24 hours at 37° C.

effect of the serum is much more pronounced. In any one series the difference in the amount of growth must be due to the serum, as this is the only variable factor.

Table V shows that the serum of patients taking T693 when mixed with an equal volume of deleuco-

cyted blood is capable of completely restraining the growth of over 100 hæmolytic streptococci for 24 hours, and that half this concentration in blood-containing leucocytes gives the same complete inhibition of over 1000 streptococci. They show also that even when the serum is diluted 16 times there is some inhibitory influence manifest on the growth of the streptococci and the production of hæmolysin.

DOES THE PATIENT'S SERUM KILL THE STREPTOCOCCI?

We have seen that the patient's serum completely inhibits the growth of streptococci. It might be said that the serum was actually lethal to the streptococcus and that leucocytes were not necessary for their destruction. A simple direct experiment was made to throw light on this question.

Volumes of 25 c.mm. of the serum of Patient B were implanted with 2·5 c.mm. of broth containing 115 hæmolytic streptococci. These were taken up in capillary tubes, incubated at 37° C., and at intervals the whole of the contents were transferred to 5 c.cm. of glucose broth, to see whether the streptococci had survived. The results obtained were as follows:—

Planted in glucose broth after { 18 hours. / 24 " / 48 " } growth.

It is clear, therefore, that a serum which, diluted twice, was capable of restraining the growth of hæmolytic streptococci could not, undiluted, kill the streptococci in two days.

Thus the serum of a patient taking T693 behaves just like serum to which the chemical has been added outside the body—it inhibits the growth of bacteria but it has no bactericidal power.

A COMPARISON OF THE ANTIBACTERIAL POWERS OF NORMAL BLOOD AND THE BLOOD OF PATIENT B

A more complete analysis of the antibacterial action of the blood of Patient B was made. The same methods were used as are shown in Tables I–IV, but in addition to hæmolytic streptococci a pneumococcus (Type 8) was used as a test organism. The results obtained are shown in Table VI.

Here we see that the patient's serum is sufficiently potent to prevent growth of hæmolytic streptococci wherever it is present, except when mixed with patient's washed corpuscles.

The results obtained with the pneumococcus are particularly interesting as this organism is not so susceptible to the drug as is the hæmolytic streptococcus. Here we see that the only mixture capable of suppressing growth completely was that containing normal blood and patient's serum. It is evident therefore that in the presence of healthy leucocytes the patient's serum had a very considerable antibacterial power. When the patient's blood or washed corpuscles were used large numbers of pneumococci grew out, although there were less in the presence of patient's serum than normal serum. It is to be noted also that in the patient's blood mixed with normal serum almost every pneumococcus grew out, showing that the patient's corpuscles were, in the presence of normal serum, incapable of killing any pneumococci. The inefficiency of the patient's corpuscles was further shown in a phagocytic experiment when they were only capable of ingesting less than one-quarter of the number of streptococci that were taken up by normal corpuscles.

In Table I it was shown that the whole blood of Patient B appeared to be weaker than that of Patients A and C, although this patient was taking as much T693 as Patient C, and twice as much as Patient A. From Tables II and III it is evident that the serum of Patient B is much more highly antistreptococcal than that of Patient A, although it is slightly less potent than Patient C's serum. A comparison of Tables II and VI shows clearly that the corpuscles of Patient B are much less efficient than those of Patient C. The relative ineffectiveness of the whole blood of Patient B is therefore due to the inefficiency of the leucocytes, and these results confirm the view that the actual destruction of the organisms is effected

TABLE VI—COMPARISON OF NORMAL BLOOD AND PATIENT B'S BLOOD

Implant of streptococci = 1108 per cell.
" pneumococci = 373 "

Normal blood.	No. of colonies. Strepto.	Pneumo.	Patient's blood.	No. of colonies. Strepto.	Pneumo.
Alone.	15	14	Alone.	0	167
+Patient's serum.	0	0	+Patient's serum.	0	148
+Normal "	9	37	+Normal "	0	364
Normal washed corpuscles.			Patient's washed corpuscles.		
+Patient's serum.	0*	14	+Patient's serum.	7*	236
+Normal "	5*	19	+Normal "	92*	248

Time of incubation = 18 hours at 37° C., except those marked * which had 18 hours at room temperature and then 4 hours at 37° C.

PHAGOCYTIC EXPERIMENT (LEUCOCYTIC EFFICIENCY TEST)

			No. of cocci ingested in 100 cells.
Patient's serum	+ strepto-cocci.	+Patient's washed corpuscles.	206
		+Normal washed corpuscles.	916

by the natural defences of the body, although these may be unable to function successfully unless the growth of the bacteria has been restrained by the chemical.

These figures are illustrative of what is likely to happen in the body in different patients, and in different infections. A patient infected with a very sensitive hæmolytic streptococcus is likely to be saved even when the natural immunity is low. This is shown by the fact that growth was completely inhibited even when the serum of Patient B was diluted by normal serum in the presence of her inefficient leucocytes. If, however, this patient is infected with a less sensitive microbe, such as the pneumococcus employed, then her serum is almost impotent in the presence of her own leucocytes, although when healthy leucocytes are present growth is completely restrained. In the case of an infection with this microbe, therefore, it is unlikely that T693 would be effective unless the natural defensive mechanism of the body was in good condition.

The number of colonies given in the various Tables, while giving an index of the number of cocci which grow out, do not by any means tell the whole story. In my previous paper I presented illustrations showing that in human blood containing no T693 the streptococcus produced coalescing areas of hæmolysis, but where T693 was present, even in a concentration of 1 in 1,000,000, the areas of hæmolysis were small. There is no doubt that T693 inhibits the growth of hæmolytic streptococci, but it also inhibits the formation of hæmolysin. It is quite likely, although

I have no evidence on this point, that it likewise inhibits the production of other toxic substances which normally might tend to protect the growing bacteria from the phagocytic cells.

Much the same thing can be seen in connexion with pneumococcus. This organism does not in human blood produce areas of hæmolysis, but each colony in normal human blood is surrounded by an area of dark bluish discoloration which may be several millimetres in diameter. When T693 is present in the blood, however, this dark discoloration disappears and the colonies appear as very small bright greenish dots. It is obvious therefore that T693 has an action on pneumococci similar to its action on hæmolytic streptococci—a delay in growth and a marked inhibition of the production of some substance which changes the surrounding blood.

These changes occur whether T693 is added to normal blood in vitro or whether serum is used from a patient who is taking T693 by the mouth. It is difficult to assess the relative importance of the action of the chemical on simple inhibition of growth or on its power of restraining the production of hæmolysins and probably other toxic substances. There is no doubt that the chemical has both of these actions and it seems likely that the beneficial action is due to both activities.

DOES T693 DECAPSULATE THE PNEUMOCOCCUS?

Observations have been made that in mice and patients treated with T693 the pneumococci have lost their capsules, and it has been inferred that the drug acted by decapsulating the pneumococcus and so rendering it an easy prey for the phagocytes. I have made a number of observations on pneumococci grown in blood in the presence of T693 and also grown in the blood of patients who have been treated with the drug and whose serum was definitely inhibitory to the organism. In such cultures the capsules were demonstrated by mixing a loopful of the culture with a small quantity of the homologous typing serum, and it was found that in these cultures the capsule swelled up just as it did in an ordinary pneumococcus culture. It seems clear, therefore, that T693 added to blood or present in a patient's blood does not in vitro prevent the capsulation of the pneumococci. A more likely mode of action is simple inhibition of growth (and possibly of toxin production), and while the organism's growth is stopped and its vitality lowered some agent in the body damages the capsule or perhaps some autolytic process occurs.

SUMMARY

1. The blood of patients taking T693 has a much increased antibacterial power against hæmolytic streptococcus and pneumococcus.

2. This increased antibacterial power lies in the serum. The efficiency of the leucocytes is not increased.

3. A patient's serum which is strongly inhibitory to streptococci is incapable of killing the cocci in two days.

4. The patient's serum not only inhibits growth but also inhibits the production by *Streptococcus pyogenes* and pneumococcus of substances which alter the blood.

5. T693 added to human blood or contained in the blood of patients taking the chemical does not prevent encapsulation of pneumococci.

6. Methods are described for estimating the antibacterial power of the serum to streptococci and pneumococci.

CLINICAL AND LABORATORY NOTES

RHEUMATOID ARTHRITIS TREATED BY MULTIPLE ARTHROTOMY AND LAVAGE

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In 1925 Key found that after hemisynovectomy of the knee-joint in rabbits the synovial membrane regenerated in 60 days. Since then results of synovectomy in arthritis have been occasionally reported. In 1932 Painter described four cases of chronic arthritis treated by synovectomy where the enlarged synovial villi were found in each case to be dark purple. He believed the value of the operation lay in the removal of the cellular accumulation which, though innocuous in itself, was causing mechanical trouble.

In this country Timbrell Fisher in 1937 advocated arthrotomy and lavage in subacute arthritis, and Swett (1938) in a recent review of synovectomy says that "the object is to do as little as will assure the needed benefits." If such benefits can be secured by washing out the joint cavity it seems preferable to avoid a more extensive operation. In the present case this was done in three joints while in the fourth joint a partial synovectomy was performed in addition.

CASE RECORD

A woman aged 35, who had been unable to work for 14 years because of her joint disability, said that at the age of 17 her left elbow gradually swelled and became so painful on movement that she had to stop work. Within 18 months her right elbow and both knees were affected similarly, and since then the joints have remained swollen and become more painful. Apart from being depressed by her condition her general health during this time has been fair. As a child she had diphtheria and she suffered from sore-throats until tonsillectomy in 1936, but the onset of the arthritis was not related to throat trouble. There is no family history of rheumatism, gout, or tuberculosis. During the 14 years she has had periods of several months in different hospitals, and physical treatment, complete rest, gold therapy, and transfusions have been tried without benefit. The right elbow was fixed by plaster in the optimum position, and before admission she had a course of 15 brine baths at a spa.

In November, 1937, she was admitted to the rheumatic unit under the care of Dr. Francis Bach. She was a thin, excitable woman in constant pain and she could hobble painfully with her knees held stiff. Over the extensor aspect of her elbows were boggy fluctuating swellings with pale skin stretched over them. Held in semiflexion there was 10° of movement in the right and 25° in the left. There was no tenderness on pressure but pain and spasm on any movement. Her knees had the same boggy swellings with palpably thickened synovial membranes above the patellæ. They were held in extension and 20° of flexion with pain could be obtained. The muscles of the arms and thighs were very wasted. All the other joints were normal and general examination revealed no abnormality. The blood pressure was 125/80 mm.

Investigations.—Red blood-cells, 4,680,000; hæmoglobin, 86 per cent.; colour-index, 0·94; white blood-cells, 5000; polymorphs, 62 per cent.; lympho-

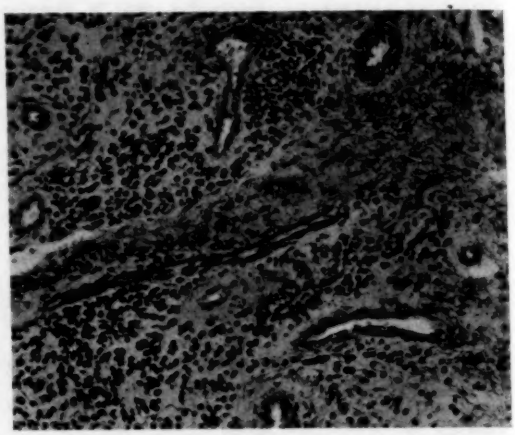
cytes, 33 per cent. On admission the sedimentation-rate (Westergen) was 42 mm./100 mm. after one hour, and monthly investigations since showed 55, 46, and 42, with a fall to 21 and 22 in the two months since the last arthrotomy and lavage. The Wassermann reaction was negative, and the Mantoux intradermal test (with 1 in 1000 Old Tuberculin) negative. A fractional test-meal showed normal levels of both free hydrochloric acid and total acidity, and a slow emptying-time. Radiography showed that the heart and lungs were normal. The elbows and knees showed generalised rarefaction of bone with slight lipping of the joint margins.

Treatment.—A diagnosis was made of the rheumatoid type of arthritis in an advanced, but still active, phase; ætiology unknown but possibly tuberculous. The patient was kept in bed, given a high calorie and vitamin diet and physical treatment in the form of general mercury-vapour light and ionisation to the knees and elbows. Neosolganal (Schering) starting at 0·01 g. and rising to 0·1 g. was given by weekly intramuscular injections. After two months' treatment with no improvement in the condition of the joints, it was decided, after consultation with Mr. Timbrell Fisher, to try the effect of arthrotomy and lavage. The left knee was chosen for the purpose.

At operation, on Nov. 22nd, 1937, by Mr. Timbrell Fisher, a small amount of glairy pale green fluid was expressed from the joint. The joint cavity was seen to be filled with enlarged synovial fringes, and pannus extended for a slight distance over the surfaces of the femur and tibia. The cartilage showed no erosion and no osteophytic growth. Some of the synovial overgrowth was removed and the joint washed out with Dakin's solution before closure. Gentle movements and faradism to the quadriceps were begun at once and as the pain in the left knee was relieved and flexion of the joint was increased (though there was slight increase of pain in the other three joints involved), it was decided to treat these similarly. Three weeks later arthrotomy and lavage only were performed on the right knee and elbow. Similar fluid to that seen in the left knee was expressed from both joints, which were filled with gelatinous synovial membrane with many enlarged fringes. The joints were washed out with Dakin's solution and closed. As these joints also became less painful and showed more movement, the left elbow was similarly treated two weeks later.

Examination of synovial membrane and joint fluid.—Dr. Hardy Eagles of the Lister Institute kindly examined the joint fluid and found it bacteriologically sterile. A guinea-pig was inoculated with the fluid and no evidence of tuberculosis was found on killing it six weeks later. No tubercle bacilli grew on Löwenstein's medium. Mr. Timbrell Fisher kindly sent me the following report on a section of the synovial membrane (see Figure): "This section seems to show the histological characteristics of the later but still active stage of rheumatoid arthritis. There are zones of fibrinoid degeneration not only at the surface but lying more deeply. The membrane is diffusely infiltrated with chronic inflammatory cells, principally lymphocytes, plasma cells, and epithelioid histiocytes. There are many perivascular collections of these types of cells. An interesting feature is that among the areas of cellular infiltration can be observed many large cells containing two or three nuclei which are indistinguishable, in my opinion, from giant cells of the Aschoff type." Mr. Timbrell Fisher has noted such cells in cases both of rheumatic fever and rheumatoid arthritis in a recent article.

Post-operative course.—Pain in the joints was immediately relieved by operation. Movement increased to 60° in each knee, to 45° in the left and 25° in the right elbow. There has been no recurrence of swelling and the patient's general condition and outlook have improved. She now walks rapidly and painlessly though with knees held more stiffly than normal. As mentioned, the sedimentation-rate has dropped from 46 to 22 mm. in one hour. There is no difference in the clinical result between the knees, one on which arthrotomy and lavage were done and the other where partial synovectomy was performed in addition. The right elbow remains the stiffer as it has done since being immobilised in plaster.



Section of synovial membrane showing diffuse infiltration with lymphocytes and perivascular accumulations. (× 135.)

DISCUSSION

The diagnosis in this case rests chiefly on the microscopic appearance of the excised synovia. It was often suggested that the polyarthritis might be tuberculous but this could never be demonstrated.

Arthrotomy and lavage had two effects: (1) it removed the boggy swelling of the joints and the mass of synovial overgrowth which was causing a mechanical interference with the movement; (2) it got rid of the synovial membrane and fluids which were acting as toxic foci, so that the general condition improved and the sedimentation-rate was halved. It is not proposed that surgical measures should be used in the early stages of rheumatoid arthritis when rest to the inflamed joint is the obvious procedure, but if, later, there are still signs of activity, as shown by a raised sedimentation-rate and joints filled with viscous fluid and inflamed synovial tissue, removal of such fluid and thickened fringes, with lavage, will eliminate a toxic and mechanical disability. The fluid in this case was too thick to be aspirated, but it could be removed by arthrotomy followed by lavage, and this seems preferable to a more extensive operation.

SUMMARY

A woman of 35 had been unable to work for 14 years because of rheumatoid arthritis in her knees and elbows. After treatment by arthrotomy and lavage of the affected joints the pain disappeared and the range of movement was greatly extended.

My thanks are due to Sir Frederick Menzies, medical officer to the London County Council, for permission to publish this case.

REFERENCES

Fisher, A. G. T. (1937) *Lancet*, **1**, 1162; *J. Bone Jt Surg.* **19**, 657.
Key, J. A. (1925) *J. Bone Jt Surg.* **7**, 793.
Painter, C. F. (1932) *Ibid*, **14**, 795.
Swett, P. P. (1938) *Ibid*, **20**, 68.

BONE ABSCESS CAUSED BY *BACILLUS AERTRYCKE*

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A short description of the following case will be of interest since there does not seem to be a similar case on record.

The patient, a man of 21, presented himself at the out-patient department of the Woolwich Memorial Hospital with a painful swelling over the head of the fibula, which had been increasing in size for the past month. There was no history of injury and he was otherwise in good health. The swelling was tender and there was increased local temperature, suggesting an inflammatory condition. The body temperature was 99·4° F. Radiography showed rarefaction of the entire head of the fibula (Fig. 1) but no bone expansion and almost no new bone formation. The diagnosis rested between a Brodie's abscess and a tuberculous infection, although the radiographic appearances were typical of neither.

It was decided that the most satisfactory treatment would be to excise the head of the fibula. This was done well below the diseased area. The adjacent soft parts showed signs of recent inflammatory reaction. On section the head of the fibula was found to be an abscess cavity (Fig. 2) containing foul, yellowish-brown pus. The pathologist reported that a Gram-negative non-lactose-fermenting bacillus had been cultured from the pus. Sugar fermentation tests suggested that this was *B. aertrycke*, and titration against specific sera was positive, agglutination occurring at 1/750. There was thus no doubt as to the organism.

A further search into the patient's history revealed an attack of "influenza" six months previously. Duodenal intubation was twice carried out but no more information was obtained. As far as the local condition was concerned the patient made an uninterrupted recovery and he was back at work a few weeks later.

FIG. 1.—Radiogram of head of the fibula.

FIG. 2.—The abscess cavity laid open.

Apart from its rarity, the case is interesting in view of the unusual radiological appearance of the bone, which, together with the clinical features, made it hard to establish a definite pre-operative diagnosis.

REPAIR OF A FISTULA OF THE PENILE URETHRA

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In July, 1937, a man aged 67 developed a fistula after suppuration round a neglected urethral stricture. The fistula was on the lateral aspect of the shaft of the penis and all the urine was being passed through it and none from the external meatus. Control of micturition was good. His urine, however, was heavily infected with motile coliform bacilli and was loaded with triple phosphates.

A suprapubic cystotomy was performed and a large de Pezzer tube introduced into the bladder. From then until his readmission early in May, 1938, he was given vesical lavage as an out-patient with periodic changing of the tube. During this time the tissues round the fistula were gradually becoming less indurated and the surrounding penile skin more freely movable. Moreover, biochemical tests indicated a decided improvement in renal function and the patient's general health became much better. A repair of the fistula was undertaken in May, 1938, in the following manner:—

A gum-elastic bougie (Charrière No. 18) was passed into the bladder from the external meatus. An elliptical incision was carried round the fistulous opening and the healthy skin undercut for a short distance round the opening. The bougie could be seen lying in the urethra and the sclerosed margins of the fistulous track were carefully cut away. The bougie was withdrawn and the eye of a probe passed

through the external meatus until its end protruded through the fistulous opening. A length of catgut was double threaded to the probe and the latter withdrawn, so that the urethra was traversed by a strand of catgut with the loop protruding from the fistula and the loose ends from the external meatus. The object of this will become apparent later. Catgut sutures, No. 000, with a curved needle at either end, were now inserted from without inwards towards the interior of the canal, each end picking up the urethral mucosa only, and being tied with the knot lying within the canal, so as to stitch the edges of the mucosa transversely to the urethral axis. The eye of the probe was employed to withdraw the long ends of each suture through the external meatus. The catgut loop traversing the urethra, as mentioned above, was used to withdraw the ends of the last suture to be inserted, as there was then no room to pass the probe when the suturing was all but completed. In this way the urethra received four transverse sutures, each picking up mucosa only, each being tied with the knot within the canal, and each having its long ends protruding through the external meatus; the object being to leave a minimum of foreign material buried in the wound. The skin surrounding the fistula was then brought together with fine interrupted horse-hair sutures. The suprapubic de Pezzer was retained.

A gentle pull on the long ends of the catgut sutures in the mucosa brought them out about six days after the operation. The bladder was drained suprapubically until the 25th day, at which time the penile wound had healed soundly. A gum-elastic catheter (Charrière No. 15) was then introduced and the de Pezzer removed. The suprapubic wound healed quickly a few days later and the patient began passing urine through the external meatus for the first time for nearly eleven months. He is now being treated as an ordinary case of stricture.

The main object of our communication is to draw attention to the following points: (1) Prolonged suprapubic drainage is necessary so that the urine becomes cleaner and the renal function and general health improve. At the same time it is remarkable how much softening of the indurated tissues surrounding the fistula can occur during prolonged suprapubic drainage. (2) The skin and mucosa surrounding the fistula must be adequately freed. (3) Transverse suturing of the mucosa with the knots inside the canal leaves a minimum of foreign material buried in the tissues. (4) Complete relaxation of the tissues to be sewn must be secured, so that there may be no tension. No grafting was necessary in this case because the skin could be stitched without pulling.

BRITISH MEDICAL ASSOCIATION

THE PLYMOUTH MEETING

(*Continued from p. 436*)

SECTION OF PHYSICAL MEDICINE

ON the last day of the meeting this section gathered at Torquay under the presidency of Dr. A. E. CARVER to consider

The Basis of National Fitness

Opening the discussion from the physiological side, Prof. E. P. CATHCART said that the essential meaning and aim of national fitness was the building up of healthy human beings, well-balanced physically, mentally, and emotionally, who will be capable of all necessary adjustments to their immediate environment in work or play. Physical training, he pointed out, is only one line of attack. Diet is important, and so are fresh air, sufficient sleep, and contentment of spirit. The aim of the present campaign, as he sees it, is to develop and perfect the capacity of each citizen for integrating the several bodily systems and thus attaining harmony of motion, grace of carriage, pride of body, mental concentration, quickness of reaction, and happiness and contentment. The training must be attractive; it must give a sense of re-creation of spirit as well as of body. There is no short cut, and no amount of help is of use unless the trainee is willing to pay the price of steadfastness and discipline. Exercises must be creative; they must either allow the performer to express something innate, or they must show him that he is gaining a new body and a new control.

No one system will suffice for all. In Prof. Cathcart's opinion the Board of Education system is sound for children, and two new handbooks issued by the Board contain many exercises from which skilled leaders can select courses suitable for others. Men from school age to 35 or so will, he thinks, benefit from "free standing" exercises with a certain amount of apparatus work; young women from those of the free-standing and floor agility type. After 35, exercises should be confined to the free-standing type for both sexes. If Lindhard's scheme were adopted as a basis and the exercises were chosen from the Board's books, a scheme could, he believed, be evolved which in a short time would transform the appearance of the average citizen. As bad posture and unilateral development are the rule, he lays special stress on the corrective exercises. The best carriage and posture vary, of course, with the individual, but the male should aim at a posture which, without being stiff, should bear the stamp of controlled force; the stance of the woman should be lighter and well poised, and suggest repose. Most of the capillaries of muscle only come into action when it is exercised, and therefore a most important function of exercise is to bring about a flushing and refreshing of the whole organism.

Prof. Cathcart had no doubt that some form of medical supervision should be provided, but foresees that it will be difficult to fix standards. A compulsory medical examination before permission is given to take part even in simple exercises may well deter many persons. The ultimate value of a medical examination might, however, be even greater than that of the training itself. The best single test of fitness is perhaps, he says, the heart tolerance test. The capacity of the cardiovascular system will give a good indication of the type of strenuous exercise for which a given person is best suited. He agrees with McCloy that there is no real reason why women whose pelvic floors are uninjured and who have no pelvic infection should not jump. The shock of landing is negligible. Perhaps exercise should be avoided during the first day of the menstrual flow, but women vary greatly in their requirements. According to the evidence, normal menstruation has no more influence on the performance of various tests than have many other accidental influences. In some women, possibly through a psychological mechanism, the period brings about greater efficiency.

DIET IN PHYSICAL TRAINING

Too much stress is laid, Prof. Cathcart thinks, on the importance of diet. Of course everyone who wishes to be physically fit must be adequately fed, but adequate feeding does not mean elaborate feeding.

According to present knowledge, a diet of brown bread, milk, butter, cheese, fresh fruit, and salad will provide all the essentials. There is no scientific evidence that meat is necessary. The breakdown of protein-containing tissues during exercise is negligible. Most athletes, however, eat large quantities of meat. The explanation may be, in part at least, that the extractives of meat are stimulating and have a definite and attractive flavour, which helps in the consumption of fats and carbohydrates. On the other hand, strict vegetarians have shown themselves to be record-breakers and capable of immense endurance. Many persons who do hard muscular work, such as lumbermen and wrestlers, consume fat-rich diets, and it is becoming increasingly evident that fats, or at any rate certain fatty acids, play a more important part than mere sources of energy. The recent work of Krogh and others shows no evidence that glucose given during work is utilised. They say that athletes ought to rest for about two days before a contest to fill up their glycogen stores. Diet, however, is not the only factor in malnutrition, and those who proclaim that all sorts of miracles will happen if the diet is altered in a certain way are running the risk of undermining the faith of the man in the street in science.

THE AVERAGE MAN

Mr. A. E. PORRITT spoke on fitness and the average man. He regards fitness, at any rate in its simplest form, as a state of being well adapted, and in this sense every individual is fit in varying degree. What this degree should involve is, he thinks, best estimated by the medical man, who should take both a physiological and a psychological point of view. An "average man" is what nearly everyone considers he is not, and that may be one reason why the average man has rather obviously failed to respond to the opening of the present campaign. Another reason, in Mr. Porritt's opinion, is that it was floated at a time of national and economic depression, and as an aftermath of a health campaign. This, he thinks, was a pity; it should at least have been the forerunner. On the other hand, the very lack of interest has provided useful data for further activities. The organisers had a stupendous task at the outset, but are now providing facilities at a satisfactory rate. The problem is to make the average man aware of them and to show him how to use them. Here the doctor, with his intimate knowledge of the family life of his patients and their environment, should play an all-important part. He should first arm himself with the requisite knowledge, and then he should discuss with his patients, their families, and their friends the extent to which they should develop their fitness, in the sense of their best possible adaptation to their own particular modes of life. He can then suggest the means by which they can most suitably and pleasurably attain this end. Fitness involves, according to Mr. Porritt's view, not only physical exercises but also the most beneficial use of leisure time, the well-being that comes from a sense of rhythm, poise, and control, and the skilful adjustment, at first conscious and then second nature, of the personality to the surroundings and people whom one encounters at work and play. Mr. Porritt suggests that every medical society should devote time to the discussion of their local problems. They should hold sessions at which some knowledgeable person should deliver a short address, but which should consist mainly of question and answer and free airing of views. Armed with this information the general practitioner should make a conscientious effort to raise questions of fitness with those with whom he comes into contact. Nevertheless, despite all that the Advisory Council and the medical profession can do, the result must depend on what each citizen does to and for himself.

THE INDUSTRIAL WORKER

Very many of those who take part in the campaign will of course be industrial workers, and they will introduce special and difficult problems. These were surveyed by Dr. LEONARD P. LOCKHART. He reminded the section that one-third of the population of the nation works in industry, and that of our youth a major part spends at least its formative years in industrial occupation. To discuss the fitness of the industrial worker is, for him, to consider social medicine in its widest and most constructive terms. The fitness movement he regards merely as a popular edition of what has been the aim of preventive medicine from the earliest times. Good wages and conditions, safety, the proper care of injuries, and attention to the physiological and emotional needs of workers, all come before recreation. Much of the essentials of fitness can be summed up as "good management." For efficient production it is necessary to study individual efficiency, and for this the manager must know the necessary physiological data about lighting, ventilation, optimum hours, rest pauses, and incentives. The last-named are comprised in good leadership and good wages. Good supervisors not only produce smooth, efficient, and peaceful working; they also train young workers to acquire skill and the inner discipline of the mind which it entails; and they are the unrecognised allies of the doctor in stemming the increasing tide of emotional disorders which are so often precipitated by lack of interest and general discontent. Doctors can do much more prophylactic work, he says, if they enable the supervisors to add to their knowledge of human beings, their needs, and their devious ways. This needs a fully enlightened labour management policy, and hence labour departments in large industries or in groups of small firms are an essential of progressive fitness. Some physiological bias should be given to general education. Much malnutrition of the spirit arises from failure to make machine production interesting to those who operate it. Pride of craft can be destroyed only with grave social risks.

Dr. Lockhart suggested several particular aspects of the problem for study. Young workers should receive medical supervision and health education, and should be followed up. They should be induced to acquire some specific skill to avoid untrained minds, and should be protected from rain in exposed work. He considers that the efficiency of young women might be increased by attention to shoes and to the effects of prolonged standing in ill-designed footgear, to proper midday feeding, and to the "no breakfast" habit. Some of the most important general problems, in his opinion, centre round the rehabilitation of injured, sick, unemployed, and incapacitated workers, and of those who have been in prison; the ratio of wages to rent plus fares; family allowances; the elimination of noise and dust; clothing; Sunday games; protective foods; gardens and other antidotes to the need to buy entertainment; and the provision of creches on housing estates to enable young couples to enjoy leisure together and still bring up a family. The facets of the problem, he says, are innumerable, but no narrow

view has value. Educational, medical, and economic factors have to be considered as a whole.

THE FIGHTING SERVICES

In considering physical fitness and the fighting services Major-General H. H. A. EMERSON said that the ideal recruit would be a youth who had developed without let or hindrance from adverse environment to the optimum of his latent powers, and had been taught to use those powers. He would have a healthy appearance, a symmetrical muscular development, and good posture and balance; his nervous system would be stable and his bodily functions harmonious and efficient. The physical standards for the Army, however, do not aim at such a high ideal. They are designed to exclude hampering defect; they demand only a moderate degree of physical development. Some statistics which General Emerson quoted show that the average recruit falls short of the optimum by a significant amount. There is no evidence that recruits break down under training, and discharges on medical grounds are all for pre-existing defects. The physical condition of recruits improves markedly during their early training, and their general appearance and outlook on life improve still more. The resting and exercise pulse-rates tend to rise during the first month and then to fall to a level below the enlistment rate. The implication is that at first the heart responds to the increased demand by increasing its rate, but as training proceeds the output per beat is increased, while the increased vital capacity diminishes the strain on the heart. After three or four years the soldier is kept fit by his daily routine and takes the special course of physical training in his stride.

The effect of training on the subnormal recruit is still more striking. In 1936, during a lean period in Army recruiting, it was suggested that an attempt should be made to recondition men found unfit for service by putting them through a special course. In the first experimental squad all the lads were stiff and awkward and had suffered from lack of exercise and fresh air in addition to under-nourishment. They were given a modicum of drill, and also educational training, physical training, and remedial exercises, and a generous diet with milk and fruit. As much as possible of the work was done in the open air. In three months 33 out of 35 were fit for service. They had arrived looking and feeling like weeds; they left cheerful, alert, and contented. During the next year they all gained in height, weight, and chest measurement. The experiment is being continued on a larger scale and is giving a success rate of 90 per cent. The active and strenuous open-air life of the service, with its generous diet and hygienic accommodation, therefore increases the efficiency of the personnel. The physical training is planned as the result of long experience and research and is given by instructors trained at the Army School of Physical Training. The men are looked after by regimental officers one of whose primary duties is the care of their men, and they are supervised by a medical service whose first duty is to maintain a high standard of health.

HOLIDAYS

Seaside holidays are playing a rapidly increasing part in the life of the people, and Sir HENRY GAUVAIN explained some of their essentials. The dweller in a seaside resort has a normal level of health; the effect on the visitor is a strong stimulus, which greatly increases the basal metabolic rate. The benefit lasts well into the winter and is succeeded by that of the spring, with its stimulus of increased light. Between June and August there is a tendency to stagnation. A few normal persons will not react to the stimulus of the sea, and should take their holidays elsewhere. In general, bathing should not be overdone in the early stages or by those whose reaction is poor.

A Demonstration

Before the meeting members of the section had the opportunity of seeing a number of recruits from the physical development depôt before and after a course of training. The demonstration was staged by General Emerson and the men were paired to show the difference in physique on entering the depôt and after spending some time there. Colonel N. P. PROCTOR assured the section that these were not picked men but just a routine sample. Each recruit had a full medical overhaul with specialist facilities when considered desirable; some, for instance, who had remained malnourished after tonsillectomy made good progress on the régime of the depôt. All the exercises were done in the open air with simple apparatus mostly made with thick bamboo canes.

MEDICINE AND THE LAW

Tuberculosis and Workmen's Compensation

A WORKMAN, claiming compensation for total incapacity due to tuberculosis, alleged that the disease was due to an accident arising out of and in the course of his employment. He said that in 1931 he had been engaged in filling a truck with concrete when the truck ran back and struck his knee. He was kept in bed for some weeks till the swelling subsided but afterwards returned to his work. He underwent operations in 1935, 1936, and 1937, and subsequently became totally incapacitated through tuberculosis, caused, as he maintained, by the accident in 1931. His employers, the Northamptonshire county council, disputed the facts and contended that the disease was of long standing and not due to the accident. Their time sheets showed that he had been at work on some of the days when he said he was in bed; they also offered evidence that he had misled the doctors by complaining of having been in pain for only three weeks when in fact the pain had existed for more than two years. The judge in the Rugby county court gave judgment for the county council.

The text-books, of course, contain many cases on the relation of disease to accident. Just as, in an action for negligence against a railway company, the defendants may have to pay heavy damages for an injury to a weakly plaintiff where a healthy person would probably not have suffered any injury, so employers may be liable for accidents due to antecedent disease. There are the cases where the workman has died because some trivial exertion was fatal to a man suffering from advanced aneurysm of the aorta. There are decisions making the employer liable when a minor injury produced gangrene in a diabetic workman, or when an alleged strain was said to have brought on hæmorrhage in a man suffering from phthisis. The question asked by the Lord Chancellor in Clover, Clayton and Co. *v.* Hughes in 1910 was whether the disease caused the death or whether the work the man was doing "helped in any material degree."

REVIEWS AND NOTICES OF BOOKS

Science for the Citizen

A Self-Educator Based on the Social Background of Scientific Discovery. By LANCELOT HOGBEN, with illustrations by J. F. HORRABIN. London: George Allen and Unwin. 1938. Pp. 1120. 12*s.* 6*d.*

H. G. Wells has sketched his idea for a World Encyclopædia as a project designed "to hold men's minds together in something like a common interpretation of reality." This is probably a polite expression meaning that the world needs some corrective for the diplopia and strabismus of modern totalitarian politics. In a small way Prof. Hogben's new book is an encyclopædia on these lines. He is not content merely to survey the world around him; he is prepared to take active steps to "remould it nearer to the heart's desire." Like its predecessor "Mathematics for the Million," this remarkable work is not exactly easy to read; as an example of popular exposition it could be bettered by a number of current books on science. Its special feature is that it has a point of view to put forward and indeed a sermon to preach. The point of view is that expressed by Bacon, that science is "such philosophy as shall not vanish in the fume of subtile, sublime or delectable speculation but shall be operative to the endowment and betterment of man's life"; in other words, science for its own sake and without reference to its social background is a snare and a delusion. The sermon Prof. Hogben would preach is the corollary of this; it is high time, he thinks, that scientists put back in the bottle the djinn that they so carelessly released.

Prof. Hogben makes his book interesting even to informed readers by his unusual choice of subjects and by his power of setting them in historical sequence. He emphasises man's struggle with his environment of force and matter—how he has harnessed for his own uses and enjoyment even the most unfriendly forces of nature, and above all how he can harness others, as unlimited opportunities open before him. To this, a faith as old as Prometheus, he gives the name "scientific humanism." What its relationship is to that other humanism which taught that man's conquest of himself was the one thing necessary may, we hope, form the subject of the next of the author's "Primers for the Age of Plenty." The strict utilitarian attitude expressed in the present book is reflected in the fact that it contains almost no account of the new atomic physics or of such subjects as relativity. This gives it a slightly old-fashioned aspect, but at the same time it provides a welcome change from the somewhat transcendental and unworldly science that has recently been supplied in such abundance in contemporary works of popular science. In "Science for the Citizen" as in other good books in the same tradition, such as Mr. Wells's "Outline of History" or the "Science of Life," there is much in detail with which the individual reader could quarrel. No man is learned enough to cover such vast fields ideally well. We can but be grateful, however, that guides can be found sanguine and resolute enough to attempt these journeys. Moreover in Hogben's book as in those of Wells we hear from time to time the ripple of that devastating laughter which, when amplified by the genius of a Beaumarchais or a Voltaire, is capable of shattering régimes.

In conclusion we would particularly commend the book to medical readers. They will have the scientific background requisite to find it specially amusing and instructive. Nor is its main thesis likely to seem over-revolutionary to medical men, for at least one section of scientists can claim to have done their best to keep their djinn in the bottle. Finally we must add that, with its 1120 well-printed pages and its wonderful series of nearly 500 illustrations, the book is also an achievement in cheap publishing.

Suicide

A Social and Historical Study. By HENRY ROMILLY FEDDEN. London: Peter Davies. 1938. Pp. 351. 12*s.* 6*d.*

THE author of this social and historical essay has handled a macabre subject in a lively manner. Nothing, he thinks, could be more unprofitable than to moralise about suicide, "The end and intention condition every action" and the suicide of Cato, for example, was a perfectly ordered end to a perfectly ordered life. The scientific approach to the phenomenon of suicide was unknown before the nineteenth century. All previous discussion of the subject was moral or religious which, being relative to time and place, can have no universal value. Among the Massegetæ, for instance, it was regarded as morally right to eat one's friends as they grew older; a custom which would certainly be frowned upon in London to-day. Two types of suicide must be sharply distinguished. First, the personal suicide of which most communities disapprove and, secondly, sacrificial or institutional suicide such as suttee or hara-kiri, of which the community may think highly. It is interesting to note that in societies with a highly organised religious or political code of ethic suicide grows rarer, whereas in freer communities where the individual confronted with a difficulty is not presented with a ready-made course of action; but has to choose one for himself, suicide becomes more frequent. A bibliography is appended but the absence of an index is a more than tiresome omission from a book which in other respects deserves to become a work of reference.

Surgical Pathology of the Diseases of the Neck

By ARTHUR E. HERTZLER, M.D., Professor of Surgery, University of Kansas. London: J. B. Lippincott Co. 1937. Pp. 237. 21*s.*

THIS is another volume in the series of monographs on surgical pathology by Prof. Hertzler. Its outstanding merit lies in the number and variety of the illustrations depicting examples of almost all the disease conditions which may be found in the neck. Every surgeon must envy the author his clinical material, and must admire the methodical way in which he has kept his records of these interesting cases. A brief clinical note accompanies each case, and this is followed by photographs showing the macroscopic and microscopic appearances of the material removed at subsequent operations. Here again the illustrations are extremely good and, taken in conjunction with the photographs before operation, are such a valuable guide to students and practitioners that they may almost be regarded as an addition to clinical experience.

As a treatise on pathology, however, this book has little merit. The author states in his introduction that surgeon and pathologist should work harmoniously together, each learning from his colleague;

but reading between the lines of his descriptions of specimens and more particularly of his commentary upon the nature of the pathological processes, one gets the impression that the advice of the pathologist has not been of much benefit to Prof. Hertzler, and that he has preferred to stick to the surgical pathology which he learned as a student. New nomenclature as well as new ideas seem to irritate him, and in many places it is even difficult for the reader to perceive his meaning. For instance, when he states "Nowhere else is it so convincingly demonstrable that there is a vast difference between surgical pathology and the pathology of the surgical tissue" it is hard to understand what he is driving at, and he even accuses the modern pathologist of using new terms to confuse his more simple-minded surgical colleagues. It may be that the significance of certain terms varies in different schools, but the use throughout the book of the term "Pathogenesis" as a heading to the paragraphs in which the clinical picture is described, and "Pathology" to those dealing with morbid anatomy is surely inappropriate.

In spite of its defects as a contribution to the science of pathology, the book may be found useful as a clinical and pathological atlas. The inclusion of clinical photographs is commendable. If curators of pathological museums placed such photographs with radiograms alongside the specimens on the shelves, their teaching value would be greatly enhanced.

Veterinary Pathology and Bacteriology

By S. H. GAIGER, F.R.C.V.S., late Professor of Veterinary Pathology, University of Liverpool. Second edition by GWILYM O. DAVIES, M.V.Sc., M.R.C.V.S., D.V.H., Lecturer in Veterinary Pathology in the University. London: Baillière, Tindall and Cox. 1938. Pp. 712. 25*s*.

VETERINARY pathology and bacteriology is ill-supplied with text-books, and the advent of a new somewhat elaborated edition of this one is welcome. Unfortunately though it will certainly help students to pass examinations, it deals too briefly with fundamental subjects to supplement adequately a course of lectures, and the student who relies on it will hardly acquire a sound foundation of knowledge. The rather illogical order of arrangement of chapters has not been altered in the new edition. General and special pathology are separated by 375 pages dealing with infectious diseases. In describing specific diseases the order followed is: bacteria, fungi, protozoa, viruses, bovine pleuropneumonia (due to an organism related to the actinomycetaceæ), heartwater, rickettsia. (Since heartwater is due to a rickettsia it would seem reasonable to include it under that head.) The procedure of quoting original work—e.g., "Bennetts (1932) showed that . . ." (p. 265)—and then omitting the exact reference to the literature is unhelpful.

As a whole the teaching is orthodox and reliable though it has lost clarity by excessive condensation. Certain divergences from widely accepted ideas include the statement that the balance of opinion on bacteriophages is against their being viruses. There is surely more to be said nowadays about the nature of antibodies and of immunity than is included in the uncritical discussion of Ehrlich's side-chain theory, which is all that is here supplied. The unwarranted custom of classifying the *Pasteurella septica* group according to the animals from which they have been isolated is adhered to and names such as *boviseptica*, *oviseptica*, and *equiseptica* are perpetuated. Lancefield's method of classifying streptococci according to group precipitins and the optimal ratio method of carrying out the precipitin test are not even mentioned. These and similar points should be attended to in a subsequent edition.

Quarterly Journal of Medicine

THE July issue contains the following papers:—

THE OUTPUT OF THE HEART IN CONGESTIVE FAILURE. By John McMichael (Royal Infirmary, Edinburgh). Observations made with Grollman's acetylene method showed that the normal postural increase in heart output which takes place on changing from the erect to the supine position diminishes and almost disappears as cardiac failure progresses. In this and other ways the failing heart shows a diminishing ability to respond to venous pressure increments by increasing its output.

THE CLINICAL VALUE OF THE ESTIMATION OF LÆVULOSE TOLERANCE BY MEANS OF ANALYSES OF BLOOD-LÆVULOSE. By Freda K. Herbert and George Davison (Newcastle-upon-Tyne). Blood lævulose was determined directly by Patterson's method, after the ingestion of 50 g. lævulose. The rise at one hour did not exceed 10–15 mg. per 100 c.cm. in 32 normal subjects or patients free from liver disease. In most patients with parenchymatous liver damage the rise was greater, up to 36 mg., but the abnormal test result was rarely found before clinical manifestations had appeared. In diabetics lævulose ingestion was followed by a rise in blood glucose.

PULMONARY TUBERCULOSIS COMPLICATING DIABETES MELLITUS. By H. P. Himsworth (University College Hospital). Pulmonary tuberculosis was looked for, clinically and radiologically, in 230 consecutive diabetics attending for the first time. Tuberculous bronchopneumonia was found in 2, X ray shadows suggesting tuberculous infiltration in 13; in those 13 clinical signs were scanty or absent, and tubercle bacilli in the sputum were demonstrated only once in 1 patient. Results of treatment of those 15 cases and 14 others, with rest and high-calorie diets (2000–2600 calories, 300 g. carbohydrate), were favourable. Prognosis in cases where pulmonary lesions were discovered early was excellent.

THE RÔLE OF COPPER IN IRON-DEFICIENCY ANÆMIA IN INFANCY. By James H. Hutchison (Glasgow). The literature is concisely reviewed. In 6 infants with nutritional anæmia iron in large doses caused some rise of hæmoglobin; copper subsequently given alone caused a further rise. In three others iron in small doses caused little or no hæmoglobin increase, but copper alone subsequently given caused a significant increase. It is concluded that copper plays a rôle in hæmoglobin formation, apparently by rendering available for that purpose iron already stored in the body.

DYSPNŒA: A REVIEW. By Ronald V. Christie (The London Hospital). Dyspnœa is defined as breathing associated with effort. The mechanism by which it is produced in various diseases is discussed, with the conclusion that in most cases it arises reflexly from pulmonary congestion, chemical changes in the blood being of minor importance.

CARDIAC ANEURYSM. By John Parkinson, D. Evan Bedford, and W. A. R. Thomson (The London Hospital and the Middlesex Hospital). An account of the causes, clinical and radiological features, diagnosis and differential diagnosis of cardiac aneurysm, based on 15 cases. The majority result from coronary occlusion and involve the anterior wall of the left ventricle near the apex.

THE GENETICS OF TRANSPOSITION OF THE VISCERA. By E. A. Cockayne. From an examination of records of its familial occurrence the author concludes that complete transposition of the viscera is inherited as a recessive character. Degrees of partial transposition occur, grading into complete transposition; they are probably all determined by the same gene. The incidence of congenital morbus cordis is abnormally high in cases of complete transposition and still higher in partial transposition.

THE LANCET

LONDON: SATURDAY, SEPTEMBER 3, 1938

DE-MECHANISED WELFARE

THE question of national physical welfare is in some danger of becoming sectionalised. Any movement towards national fitness is so obviously the concern of the medical profession that it seems desirable to clarify the position and to place the component parts of this movement in their proper perspective. When the physical medicine section of the B.M.A. met at Torquay (a report appears on another page) concern was expressed that medicine should play its part in the campaign for improving the physique of the people in view of the fact that the movement is essentially a popular edition of what has been the aim of preventive medicine from earliest times. In the lay mind the fitness movement, as it is popularly termed, is being sponsored by the Government, but this is not quite correct. Insofar as a movement exists it is a general feeling that we must take adequate and immediate steps to turn to practical account all our knowledge of human welfare in its widest sense. We are therefore concerned with nutritional, economic, domestic, industrial, and recreational factors. General hygiene has its place, but as Prof. CATHCART pointed out, there is no single item that can be profitably isolated from the complex. Neither can physical fitness be divorced from mental well-being and there is a malnutrition of the spirit as widespread and important as malnutrition of the body. The two are interdependent and thus the ideas dominating our social and industrial life have their significance in the development of true fitness. This brings us to the definition of fitness which we feel is a prerequisite of any attempt to seek it. We have to fit men and women to live full, creative, and healthy lives, making the utmost of their innate abilities, overcoming as far as possible their inherited or acquired handicaps, and doing our best to reduce these handicaps and improve the chances of oncoming generations.

It would be a mistake to imagine that the National Fitness Council can within a short time effect profound changes in this complete well-being. That is not its function. The Council is by statute given the task of advising H.M. Government on matters of physical well-being "by means of exercise and recreation." The task is a large and important one, but it is only a part of a greater whole. Nothing but disappointment can result if all the tasks are left to a body which by its constitution is concerned with only a limited field. Now however that a medical advisory body has come into being we may hope that through its efforts the Council will be given wider powers and a larger mandate, and so in due course be fitted into the wider conception of social medicine. Once this is done we shall find ourselves faced with a number of interrelated matters, some of which were discussed at Torquay. Malnutrition is not solely a matter of feeding; the proper nurture of the body requires suitable food, adequate sleep, freedom from needless noise and disturbance, and a contented mind. Major-General EMERSON and Lieut.-Colonel PROCTOR demonstrated this when they showed the results of their work on sub-standard army recruits. Mr. PORRITT and Sir HENRY GAUVAIN were equally emphatic that proper nutrition must be ensured before other aspects of fitness could be considered. Dr. LOCKHART took the discussion into the industrial field and showed the bearing on personal well-being of the mental and physical environment of work. Good management of factory life implies a proper physiological understanding. Machine production has had the effect of reducing the need for specific skill with the result that a large proportion of young people have not acquired the inner mental discipline that such skill engenders. Thus they need always to be catered for, and the urbanisation which has already divorced people from contact with nature is being further aggravated by a diminution of true manual education. Mr. H. G. WELLS and Mr. F. PICK made this clear enough at the Cambridge meeting of the British Association. To tackle fitness in its widest sense we shall have to ensure that those who are to control the lives of others shall understand their physiological and emotional needs. We shall have to train overseers who oversee and do not overlook.

A revival of agriculture would help substantially to solve some of the difficulties of adolescence. A spell of contact with the soil during which bodies, well fed and cared for, became inured to physical exercise in the open air under all conditions would do much to further mental as well as physical development. The experiment has been tried elsewhere and has much to recommend it, for it gives a certain independent twist to life at a crucial period which should be a prophylactic against urbanisation. The recreative facilities provided by the National Fitness Council would be more widely used and more beneficially utilised by young people who had learnt the habit of the open-air life. Allotment schemes and the provision of adequate gardens in town-planning would carry on the good work and enable the adult to solve his leisure problem other than by recourse to mechanised amusements. National fitness is a state of public and personal well-being which can only be attained by methods that are new and perhaps revolutionary. Without something larger of this kind we may soon discover that the existing framework of our ideas fails to give results and that no system of grants nor the provision of isolated facilities will avail. "There is only one way of seeing things rightly," said PASTEUR, "and that is seeing the whole of them." The time has come when national fitness must be reviewed in its medical, educational, and economic framework; it is not a field for any one group of interests;

but medicine is a part, and a vital part, of it. The boundaries of medicine, as well as of every other social science, are enlarging more rapidly than perhaps we are prepared to admit.

RENAL CALCULI AS A COMPLICATION

ONE of the risks run by patients immobilised by bone disease or injury is the risk of developing stone in the kidney. Bone repair involves local decalcification; prolonged fixation of the limbs leads to a more generalised bone rarefaction; and both processes favour excess of calcium in the urine. Stagnation, concentration, or infection of the urine in the renal pelves may then cause precipitation of the excess calcium as stones or as casts of the calyces. But these events are not inevitable; indeed Mr. PYRAH and Dr. FOWWEATHER [1] believe that the formation of calculi can be altogether prevented. They do not attach much importance to excess of vitamin D as a source of danger, for they have not found much evidence of its harmful effect in the cases they report. Though they recognise that liberal administration of fish-liver oils and exposure to sunlight may raise the vitamin-D content of the body too high, and thus predispose to calcification, they are more impressed by the direct effect of the sun in concentrating the urine by removal of fluid in perspiration. In a discussion at the Medical Society of London reported in our columns last year [2] Mr. JOHN EVERIDGE, relating his experience as consulting urologist to Carshalton Orthopædic Hospital, recommended that loss of body fluid should be combated by keeping the children in the shade; one of the difficulties, he said, was to get them to drink enough. PYRAH and FOWWEATHER propose that recumbent patients should have large amounts of fluid administered at regular intervals. Water, which is neutral, or barley-water, which leaves an acid "ash," are preferred to lemon drinks, which give an alkaline ash and thus make for deposition of calcium. A diet they have planned to give the proper acidity includes cereals, bread-and-butter, eggs and cream, fish (of the "fat fish" varieties), meat, lentils, cheese, and plums. The aim is to produce a urine with a *p*H of 4·8 to 5·3, and ammonium chloride, 7–10 grains taken in capsules every four hours, can be used to hasten its production. One patient treated with this acidogenic diet rapidly got rid of calculi known to have been present in both kidneys for three years; the stones were passed as small pieces of grit, accompanied at times by hæmaturia.

There is no general agreement about the effect of posture in causing stagnation of the urine. In the discussion already mentioned Mr. EVERIDGE thought it important and said that children kept in the Trendelenburg position were apt to get stones in the upper calyx of the kidney. Mr. G. B. WOODD WALKER and Mr. F. M. LOUGHNANE disagreed with him over the part played by gravity in emptying the renal pelvis and in the formation of stones, but Mr. OGIER WARD,[3] on the other hand, has long made use of posture as well as diuresis in the treatment of patients with a tendency to form renal calculi, and claims that stones are passed in direct consequence of the measures he has devised. It may readily be imagined, though it is hard to prove, that a solid particle caught in a calyx might find special difficulty in reaching the pelvic outlet when the patient is tilted head-downwards; and, if retained, such a particle might serve as the nucleus of a large deposit. At the same time RANDALL'S [4] discovery of minute plaques of calcification under the mucous membrane of the papillæ in apparently normal kidneys has suggested a rather different mechanism for the genesis of calculi, in which gravity plays a minor part compared with the composition and concentration of the urine. Probably the tilting and turning of patients on their fixation frames—advised, for example, by Mr. WHITCHURCH HOWELL in the Medical Society discussion—is of less actual value than the exercise of every part of the patient not completely immobilised, making use of massage and active muscle contractions and movements of unaffected joints. The active circulation in muscles and ligaments aims at preventing excessive decalcification and is to this extent radical.

A wise precaution with recumbent patients is periodical examination of the urine for red blood-cells. Even in the absence of radiographic evidence of stone, red blood-cells in the urine should be taken as presumptive evidence of calculus formation and particular attention should be paid to the fluid intake and to the reaction of the urine. Infection of the urine may well be the most important factor of all, and, as PYRAH and FOWWEATHER remark, calculi associated with gross infection must be removed by operation. Certainly when a patient stays long in bed one must eliminate as far as possible every cause of urinary infection and, if it should arise, treat it promptly.

THE DOCTOR AND HIS EMPLOYEES

Is the medical or dental practitioner legally liable to pay contributions under the National Health and Unemployment Insurance Acts for his employees—nurses, dispensers, secretaries, dental mechanics, and the like? A leaflet (Memo 317 X), issued by the Ministries of Health and Labour, does its best to answer this question by bringing together the law collected from complicated statutes, departmental documents, and judicial decisions.

Health insurance and contributory pensions contributions are generally required for all persons who have reached the school-leaving age and are employed under a contract of service at a rate not exceeding £250 a year for whole-time work or without any limit of remuneration if they are manual labourers. Persons whose pay is less than £250 a year are insurable in any event. The

[1] Pyrah, L. N., and Fowweather, F. S., *Brit. J. Surg.* July, 1938, p. 98.
[2] *Lancet*, 1937, 1, 633.
[3] Ward, R. O., *Ibid*, p. 23.
[4] Randall, A., *Ann. Surg.* 1937, 105, 1009; see *Lancet*, 1937, 2, 93.

question whether work is manual labour or not therefore does not matter unless the remuneration exceeds that sum. It will principally arise over dental mechanics and chauffeurs. Mr. Justice (now Lord) ROCHE decided some years ago that a dental mechanic is employed by way of manual labour in spite of the fact that he supervises assistants in addition to engaging in the manipulative work involved in making dentures, plates, artificial teeth, and crowns. But a dentist's assistant who is engaged in the ordinary duties of a qualified dentist and attends patients in that capacity is not deemed to be employed in manual labour. The governing consideration is this—what is the main and substantial nature of his duties? If he is mainly and substantially a dental mechanic, he is deemed a manual labourer. The Insurance Department of the Ministry of Health will give rulings in doubtful cases. A chauffeur, if required (as presumably he usually will be) to clean the car and to do running repairs in addition to driving, is normally deemed to be employed in manual labour. He is therefore compulsorily insurable irrespective of the rate of his remuneration. The contributions for insurable persons must be paid weekly. If a person is employed by two different employers in one week, the first employer is responsible. Advice will be given on points of difficulty by the local inspector. His address can be obtained from the local insurance committee or from the local post office.

Contributions under the Unemployment Insurance Acts are generally required in respect of any person who comes within health and pensions insurance. But an exception occurs in the case of two classes of persons employed by professional men—namely, employment as a female professional nurse for the sick and employment in domestic service. Women nurses have been excepted from unemployment insurance since July, 1922, since which date no contributions have been required in respect of them. But this exception does not apply to dispensers, secretaries, or persons employed by doctors or dentists to receive patients, answer the telephone, make appointments, clean and sterilise instruments, clean and dust the surgery, mix cement, hand instruments, &c., to the dentist, or attend on anæsthetic cases, unless, of course, the attendant is a duly qualified nurse, employed as such and therefore ipso-facto exempt. Ever since 1920 domestic workers have been insurable for unemployment if they are employed in a business carried on for the purposes of gain. Another decision of Mr. Justice ROCHE held that a doctor carries on business for the purposes of gain within the meaning of the statute. He has also held that a chauffeur primarily employed to drive a doctor on his rounds, and a domestic servant employed by a doctor in a nursing-home carried on by him in addition to his practice, are employed in the business of the doctor. Hence these employees must be insured. It is held that these decisions cover in principle servants employed to attend patients or staff in a nursing-home and servants employed at the surgery to admit patients, make appointments, and so on. There are special complications in the case of the chauffeur-gardener; qua private chauffeur he became insurable under the general scheme last April while qua private gardener he became insurable at special rates under the extension of unemployment insurance to agriculture in February, 1937. The appropriate rate will be determined by the work which occupies the greater part of the man's time in the week.

As has already been said above, the insurability of doctors' or dentists' servants is based on the fact of their employment in a business carried on for gain. It follows that private domestic servants, if employed solely in connexion with the employer's personal needs, need not be insured against unemployment; they are not deemed employed in the business. If they do no more than clean the surgery and admit occasional patients, they do not count as being employed in the business; nor do part-time cleaners who are employed wholly outside the employer's business hours or for only a short time inside those hours. Naturally there will be plenty of cases where the domestic servant is partly employed in the professional business and partly in the private and personal service of the employer. They are to be regarded as insurable if their substantial employment is insurable employment. What is "substantial"? Once more the High Court has elucidated the point. Mr. Justice ROCHE held that one-third is a substantial part of an employee's working hours. This system of judicial interpretation, invited on test cases by the Ministry of Labour, is a camouflaged and successful method of persuading the judges to do something which they might otherwise resent—viz., to act as legal advisers to departments and to answer abstract questions. To the ordinary citizen the result is more important than the method. Certainty is more valuable to him than the preservation of judicial conventions. The professional man is entitled to grumble when the conduct of his work is hampered by this network of legal liabilities so intricate and technical. At least, however, the Ministries of Health and Labour have done their best to expound to him his responsibilities.

THE LONDON EMERGENCY BED SERVICE.—Appreciation of this service has been widely felt and some expression has been given to it in our correspondence columns. Mr. R. E. Peers, the secretary, writes: "There is one point I would like to make known. When the service was first opened we did not have the telephone number put in the directory for fear of its being used for bogus calls, and in consequence a number of the doctors who have read the letters appearing in your columns have been unable to get in touch with us at once. The number, which is Metropolitan 8781, will appear in future issues of the directory. The service has now been going for just over two months, and I hope that by the end of this week we shall have received our thousandth call."

BOARD OF CONTROL.—Dr. R. G. Anderson has been appointed a commissioner of the board in place of Surgeon Rear-Admiral J. Falconer Hall, who has retired.

ANNOTATIONS

THE DIAGNOSIS OF SYPHILIS

"But I see an incredulous look on some faces and I hear the whispered comment—'tis heard often enough! 'Where is all this syphilis? It does not come my way.' Yes it does. The syphilis we see, but do not recognize, everywhere awaits diagnosis, so protean are its manifestations."

THESE were Sir William Osler's words to the Medical Society of London and they are aptly quoted by the assistant surgeon-general of the United States public health service in his foreword to a summary,[1] by Dr. Joseph Earle Moore of Johns Hopkins Hospital, of all that the practitioner need know to guide him in the diagnosis of syphilis. Moore believes that failure to reduce the incidence of syphilis in the United States, though partly the result of faulty methods of treatment, is chiefly due to inability to diagnose the lesions of syphilis and to lack of organised effort to seek out and bring under treatment infected patients who have no obvious lesions. These shortcomings he attributes to three main causes. The first is the attitude of many medical practitioners who still regard syphilis not as a disease but as a disgrace, and, believing that it is confined to Negroes, prostitutes, and criminals, refuse to consider the possibility of infection among their own patients. Secondly, it seems that there is no general comprehension of the prevalence of the infection; 500,000 fresh infections yearly in the United States, or a total of 10,000,000 adult syphilitics, are figures which, like the national debt, cannot be interpreted in terms of personal experience. But the third and most important reason for failure is held to be faulty diagnosis, with insufficient use of serological tests which are 95 per cent. efficient for excluding syphilis. The lesions of this disease are so diverse, and they so often resemble those of other diseases, that errors are bound to arise if complete reliance is placed on clinical acumen. Moore criticises the teaching of this subject in many medical schools where information about syphilis is all too often acquired haphazardly in the water-tight sections of the general and special departments. In this way the student is overburdened with detail and is expected to acquire a many sided expertness of diagnostic ability which is quite beyond his powers. In making his survey Moore therefore confines himself to the broad principle of diagnosis of each stage of syphilis and tabulates the essential diagnostic maxims, the basic characteristics of the various manifestations, and the common sources of difficulty in differential diagnosis. Although his booklet is primarily for the general practitioner and the student, no practitioner or specialist in any branch of medicine could fail to benefit from reading it and reading it often. It is pointed out that the syphilologist as often as not sees the patient after the label "syphilis" has been attached to him, and his function is to assess the extent of the damage and plan treatment accordingly. The diagnosis of syphilis, on the other hand, is a task that cannot be delegated to the few, and remains the responsibility of every member of the profession who is in touch with clinical medicine. Of late years the incidence of syphilis has declined in this country and there is reason to believe that our problem is not so acute as that of the U.S.A. Yet for this very reason it is possible that recent generations of students have seen few or none of the early manifestations of syphilis. The need for care and watchfulness is therefore greater and Moore's recurring slogans, "suspect syphilis," and, "do a blood test," require the greater emphasis. There is, too, much to commend the practice which he advocates of submitting all hospital patients to routine blood tests for the exclusion of syphilis.

[1] Moore, J. E., The Diagnosis of Syphilis by the General Practitioner. Suppl. No. 5 to *Venereal Disease Information* (U.S. Publ. Hlth Serv.), 1938.

THE PHOSPHATASE TEST

THE white-paper on milk policy published last year [1] gave grounds for the hope that local authorities will soon be able to ensure that all ordinary milk retailed in their areas is efficiently pasteurised. In any human activity it is always difficult to secure efficiency by compulsion, and when no real criterion of efficiency is in existence—as has been the case with pasteurisation—the task becomes harder still. It is therefore fortunate that the proposed legislation should have been preceded by the discovery of a test which is receiving general approval as a means of assessing the degree of efficiency of pasteurisation. The phosphatase test, accounts of whose application were published by us three years [2] and a year [3] ago, has now been in regular use in many laboratories in this country since 1935, and has also been taken up with enthusiasm in the United States either in its original form or with modifications [4] which are stated to suit American conditions of pasteurisation rather better than the original method. Favourable reports have been published from that country,[5] and also from Canada,[6] Holland,[7] Denmark,[8] Australia,[9] and recently from Italy.[10] If in course of time the high-temperature short-time method of pasteurisation, with its obvious advantages from the commercial standpoint, is given legal status in this country, it seems likely that the phosphatase test will remain equally valuable. It appears that over all ranges of time and temperature of exposure of milk to heat the common pathogenic organisms in that fluid are destroyed rather more easily than the phosphatase—i.e., the absence of this enzyme from a sample of pasteurised milk really does indicate efficiency of pasteurisation from the public health point of view. Naturally, as pointed out by Smith,[6] the test checks pasteurisation only up to the completion of the pasteurisation process (with the important exception that the post-pasteurisation addition of raw milk or raw cream in amounts as small as 0·2 per cent. of the whole bulk can be detected). Post-pasteurisation contamination—e.g., with coliform organisms from a dirty bottling plant—which would diminish the keeping quality of the milk, or even contamination with pathogenic organisms from some material not containing phosphatase, would not lead to a positive test.

From the work just quoted it appears that the phosphatase test, whenever it has been given careful trial, has stood up to examination. Like most laboratory methods it requires reasonably skilled hands, adequate equipment, and a certain amount of

[1] Cmd. 5533, H.M. Stationery Office, 1937.
[2] Kay, H. D., *Lancet*, 1935, **1**, 1516.
[3] Hoy, W. A., and Neave, F. K., *Ibid*, 1937, **2**, 595.
[4] Gilcreas, F. W., and Davis, W. S., Proc. Thirtieth Annual Convention Int. Ass. Milk Dealers, 1937, p. 34; Scharer, H. J., *Dairy Sci.* 1938, **21**, 21.
[5] Various authors, *Amer. J. publ. Hlth*, 1938, **28**, 317, 320, 323.
[6] Smith, M. D., *Canad. publ. Hlth J.* 1938, **29**, 288.
[7] Koppejan, C. A., C.R. Vᵉ Congrès International technique et chimique des Industries Agricoles, 1937, p. 325.
[8] Jacobsen, *Z. Untersuch. Lebensmitt.* 1936, **71**, 515.
[9] Trembath, R. N., and Newman, F. S. J., *J. Dep. Agric. Vict.* 1938, **36**, 88.
[10] Alessandrini, A., *Ann. Igiene*, July, 1938 p. 406.

experience to enable the best use to be made of it; but if or when the white-paper policy is carried out local authorities will find their duties much simplified by this new aid to the practice of public health.

SERUM TRANSFUSION IN NEPHROSIS

DEHYDRATION of serum, as developed by Flosdorf and Mudd,[1] has greatly facilitated its transfusion in large quantity, and the treatment of nephrosis by such transfusion has been tried by Aldrich and his associates.[2] Intravenous injection of four-times-concentrated serum produced diuresis, with complete loss of œdema, in 6 out of 9 children suffering from typical nephrosis, and 4 of these showed also a return of the urine to normal. The fact that diuresis immediately followed the serum injection makes it improbable that the improvement was spontaneous. Yet the increase in serum protein as a result of the injection did not seem to the investigators sufficient to draw fluid into the circulation and thus to account for the diuresis, and they believe that there must be some other mechanism. Whatever the mechanism may turn out to be, it is clear that this mode of treatment deserves further trial. And the possibilities for the use of vacuum-dried serum are by no means exhausted.

INSTRUCTION IN MOTHERCRAFT

THE national health campaign inaugurated by the Prime Minister last October laid special stress on the importance of protecting the health of mothers and children, and as a result the calls on the various maternity and child welfare agencies have become much more numerous, and there has been a remarkable increase in the circulation of pamphlets, leaflets, posters, and other publications giving simple practical instruction in the principles and practice of mothercraft. The attractive bookstall devoted to health literature at the Glasgow Empire Exhibition has been busy from the outset, and, to give one example only, the pamphlet "To Mothers and Fathers," first issued by the Association of Maternity and Child Welfare Centres 14 years ago, has had so wide a circulation that a new edition, beginning the second million, has been unexpectedly called for. A series of photographs staged by the maternity and child welfare department of the Glasgow Corporation has been a centre of interest from the time the exhibition was opened, and the hope was frequently expressed that they would be recorded in some permanent and accessible form. This has been done. The photographs will shortly be published as part of an illustrated booklet, "The Health of Mother and Child," issued jointly by the Department of Health for Scotland and the Glasgow Corporation.

The booklet presents within the compass of seventy-six pages a surprising amount of information set out in clear, direct, and concise language, and the photographs have been skilfully selected. After a section on antenatal care, breast-feeding is explained with the help of some very telling pictures, and simple practical instruction is given on bottle-feeding, the feeding of children between one and five years, the general hygiene of infancy and childhood, mental health and character training, common ailments, and food recipes, and the concluding fifteen pages, profusely illustrated, are devoted to children's clothing. The booklet bears the impress of long practical experience, and that it is intended to supplement, not to supersede, personal instruction is made clear on the first page:—

"The rules which an expectant mother should follow are not difficult, but each one is essential. This book has been written to help you to remember these rules, but you should first learn what the rules are by a personal visit to your doctor or to the antenatal clinic. By getting advice early you give the doctor the best possible chance to keep you well, and under his care you should not need any medical treatment at all. While you are attending your doctor or the antenatal clinic, you will find this book useful as a guide. Keep it in your own home and read it often."

Throughout the advice given is in accordance with modern teaching and practitioners will find it useful for the purpose of familiarising mothers, actual or prospective, with the precautions that should be taken for the sake both of mother and child during the antenatal and postnatal periods.

It is instructive to compare this booklet with the advisory leaflets that local authorities prepared and distributed some thirty-five years ago, when they began to regard the provision of instruction in infant care as part of their public health functions. At that time, in the pre-vitamin days, the diet of a young child was much more restricted. It was then never suggested that a breast-fed child a month old should be given fruit juice and cod-liver oil two drops daily to be gradually increased to half a teaspoonful at the end of the second month, or that in the sixth month breast-feeding might with advantage be supplemented by sieved vegetable, bone and vegetable broth, egg-yolk, and oatmeal porridge. While it is true, and must long remain true, that the prevention of illness looms large in the teaching of health, there is here welcome evidence of the gradual growth of a body of information about healthy living.

PNEUMOCOCCUS TYPES IN SOUTH AFRICA

SINCE F. S. (now Sir Spencer) Lister published his classical work in 1913 on the serological types of pneumococci responsible for the pneumonias among the mining natives in the Witwatersrand goldfields, the South African Institute of Medical Research has maintained an active interest in the ætiology and prevention of this infection. The earlier work showed that one effect of inoculating the natives with a polyvalent vaccine of the prevalent pneumococcal types was to change the bacterial flora of the pneumonias; there was a distinct fall in the incidence of the previously prevalent types, a relative increase of new pneumococcal types, and a larger proportion of infections due to the hæmolytic streptococcus and Pfeiffer's bacillus. The work of differentiating the new pneumococcal types was continued by D. Ordman, using the letters of the English and later of the Greek alphabet, with the primary object of determining whether any one new type was of sufficient frequency to require its being included in the compound pneumococcal vaccine used for prophylaxis. Ordman [1] has now correlated his types with those of G. Cooper and her American associates and has found that all the American types, save XXXI and XXXII, are represented in the South African series of which only two do not correspond with any of the thirty American types. He has further subdivided some 1500 cases of pneumococcal lobar and bronchopneumonia into four main groups affecting (1) Europeans, (2) non-mining natives, (3) mining natives,

[1] Flosdorf, E. W., and Mudd, S., *J. Immunol.* 1935, **29**, 389.
[2] Aldrich, C. A., Stokes, J., Killingsworth, W. P., and McGuinness, A. C., *J. Amer. med. Ass.* 1938, **111**, 129.

[1] *Publ. S. Afr. Inst. med. Res.* 1938, vol. ix, No. xliii.

and (4) mining natives inoculated against pneumonia, and has compared the incidence of the infecting types in these groups. The pneumococcus types included in the prophylactic vaccine were I, II, III, V, VII, XII, and XIV. The incidence of types I and II infections in the first three groups was respectively 59·9, 42·7, and 42·3 per cent. and in the inoculated group 17·7 per cent., but this obvious protective effect was apparently not maintained against the other types in the vaccine even if type III, an admittedly poor immunising agent, is excluded. It should, however, be pointed out that among the inoculated community the pneumococcus was not isolated from 31·2 per cent. of the cases of pneumonia, whereas the corresponding figure for the uninoculated group was 11·6 per cent.

Turning to a comparison of the principal infecting types in Johannesburg with those prevalent in New York—the data compiled by Bullowa and Wilcox [2] are used—Ordman finds that types I, III, VII, and XIV occur in about the same proportions in the two cities, type II is almost twice as prevalent in South Africa as in America, while types IV, V, and VIII, relatively common in America, are rare in the South African series in which type XII ranks fifth in frequency. Analyses have been made of the types found at autopsy on pneumonias and of the types in pneumococcal meningitis and other infections and their distribution compared with corresponding American statistics. Although the fact emerges that there is a heterogeneous variety of types in infections other than pneumonia, even if type I is predominant in the meningitis group, Ordman warns his readers against making a fetish of endless pneumococcus typing; since, among the pneumonias at least, the bulk of the infections seem to be due to some nine or ten types.

MERCURY TREATMENT AND G.P.I

COPENHAGEN is probably the only large city in which syphilis has been a notifiable disease for over half a century, and Dr. Povl Heiberg,[3] the deputy medical officer of health, has made use of its unique records to re-examine the still vexed problem of the ætiology of general paresis. The classical studies of Jessen, Kjeldberg, and Jespersen, and the subsequent finding by Noguchi and others of the spirochæte in the brains of general paralytics, abundantly showed that the disease is a manifestation of syphilis. But its incidence on syphilitics was very variable and factors additional to syphilis have been suggested as of possible causal importance. Jespersen in particular studied the possibility that mercurial treatment might have something to do with the origin of general paralysis, but rejected the view mainly on the argument that the period between treatment and the appearance of paretic symptoms is usually too long to be accounted for by any toxic effect of mercury. Aebly and other more recent writers have however supported the view that general paresis is in some way connected with mercury. Certainly so far as one can judge from general impressions the disease appeared to be more prevalent during the epoch of intensive mercurial treatment introduced by Fournier and has become less common since non-mercurial remedies have won the field.

Heiberg presents a graph giving the mortality of general paralysis in Copenhagen during the period 1866–1935. He divides the seventy years into 14 quinquenniums, and the figures show an increase from 8 deaths in the first to 55 in the eleventh (1916–20). The last quinquenniums on the other hand show a rapid fall of deaths attributed to general paresis; thus in the last of all there were not half as many deaths from general paresis as there were in 1916–20, though Copenhagen, during the intervening fifteen years, has increased its population by nearly a quarter. The curve of deaths from tabes dorsalis runs a very similar course. Heiberg points out that from 1924 onwards mercurial inunction for syphilis was almost abandoned in Copenhagen, being replaced by newer and more effective forms of treatment, and he thinks the form of these curves can only be reasonably explained by the supposition that intensive mercurial treatment was partly responsible for general paresis and for tabes dorsalis.

[2] Bullowa, J. G. M., and Wilcox, C., *Arch. intern. Med.* 1937, 59, 394.

[3] Heiberg, P., *J. Hyg., Camb.* July, 1938, p. 500.

SCIENCE AND SOCIAL RELATIONS

A MONTH or two ago our premier scientific weekly raised the question [1] of forming a new body to study the social relations of science. There was then a large measure of agreement among the forty representative scientific workers that some agency was needed to bring scientists into closer touch with each other and with social workers and men of affairs, and to study the momentous problems created by the rapid progress of science in many fields. It was pointed out that advances in knowledge had not been accompanied by advances in social ethics, and that man's rapidly increasing control of nature's resources had been put to base uses and threatened to destroy everything that is valuable in modern civilisation. The last forty years have seen man's conquest of the air. Machines heavier than air now carry passengers to and fro all over the world; and within a few years, perhaps months, transatlantic air services will make it possible for New Yorkers to read London newspapers, and for Londoners to read New York papers, within 24 hours of publication. But in view of the chief purpose for which the improved manufacture of aircraft is being intensively studied, it may reasonably be held that it would have been better for mankind if the science of aeronautics had never come into being.

It was for the study of such problems that most of those taking part in the *Nature* symposium thought a new body should be formed. The proposal appealed at once to the British Association meeting at Cambridge last month when it was decided to nominate a committee to establish the machinery of a new International and Social Relations Division. The precise functions of the Division, which though affiliated to the Association will have a large measure of autonomy, have not yet been determined, but it is intended that they shall be extensive. The new body will undertake research; establish international contacts; act in a consultative capacity and as a central information office; afford opportunities for discussing the social aspects of science; and by publishing papers and in other ways bring the subject prominently before the public. The work of the Division will clearly be of great importance, and much will depend upon the initial steps taken by the committee that has just been formed. Its constitution inspires confidence. The members are: Lord Stamp, Sir Richard Gregory, Sir Daniel Hall, Sir Henry Tizard, Dr. Julian Huxley, Dr. C. S. Myers, Professors D. L. Chapman, H. J. Fleure, A. V. Hill, J. G. Smith, and F. E. Weiss, Mr. H. G. Wells, and

[1] *Nature*, April 23rd, 1938; see *Lancet*, 1938, 1, 1005.

Mr. C. J. S. Wilson. It is hoped that Sir Albert Seward, the new president of the British Association, will also serve on the committee. This list of distinguished names shows that the committee will bring to the formidable task entrusted to it high scientific attainments, wide experience in the practical application of science to human needs, and imaginative insight.

THE FRIENDLY ENEMY

Ubi pus, ibi evacua has been a surgical principle for many centuries, and when it is applied to a well-localised collection of "good and laudable pus" one of the most satisfactory of surgical operations is performed. But modern surgery is sometimes a little too clever; to give an anæsthetic and make an incision has become so easy that a suppurative process is sometimes disturbed before the time is ripe. The results of such ill-judged attacks, especially in early streptococcal infections, may be serious or even fatal, and in order to warn eager young practitioners against such errors a new dictum, trenchant if perhaps facetious, has been derived from the old: "Where there is not pus, do not let it out." It is well, too, that we should remind ourselves what is the significance of pus from the surgeon's point of view. Dr. John O. Bowen,[1] who has recently reconsidered it, points out that suppuration is a manifestation of a local tissue immunity. Without this immunity the surgeon is helpless, and operation can play no part in this vital process; the surgeon can only help to evacuate the waste products once they are formed and by this time the main battle is either lost or won. Realisation of this fact (or rather the recollection, for it is elementary pathology) must induce a more conservative attitude to suppuration, and such is the tendency to-day. "They also serve who only stand and wait."

The treatment of cellulitis and acute streptococcal empyema, of carbuncle and acute osteomyelitis—all these provide examples of the more conservative treatment now in vogue. Acute appendicitis, however, remains an exception. In the early cases the reason is obvious, for by appendicectomy the whole suppurative focus is extirpated; obviously an ideal treatment. Operation in the later stages may still remove the appendix—which is a source of continuous reinfection—even though there is now peritonitis, and can usually control the direction and degree of spread of the infective process. In appendicitis therefore far more is at issue than the simple evacuation of pus. Nevertheless, a patient can never recover from acute appendicitis, with or without operation, unless there is an effective local immunity, and operation in the later stages of appendicitis with localised peritonitis must do nothing to damage the barriers that have been erected or it will do more harm than good. Operation should be coöperation with nature.

Bowen points out that the neutrophil leucocyte is not the principal cell taking part in the development of local tissue immunity, but that "larger cells, the macrophages, principally the clasmatocytes, play the important rôle." Although a neutrophilic response is the first reaction of a non-immune animal to an infective agent, the neutrophils have mostly been replaced by monocytes and clasmatocytes by the time that antibodies can be demonstrated locally. "From the time micro-organisms and neutrophils meet, until local and humoral products are formed, progressive cellular or tissue changes in systematic succession occur; if uninterrupted by man, there will develop, invariably, a localised collection of material, the end result of a process designed for our protection—pus, the friendly enemy."

[1] *Surg. Gynec. Obstet.* July, 1938, p. 124.

TUBERCULOUS SEQUENCES

Two Danish tuberculosis officers, Lassen and Stigaard,[1] have been looking at tuberculous infection from a new angle. They compare two groups, each of 100 patients, all of whom suffered at some time or other from open pulmonary tuberculosis. The first group is a consecutive series of patients who recovered—i.e., became completely symptom-free for three years or more, without tubercle bacilli in the sputum, with a normal sedimentation-rate, and a radiological picture showing no evidence of active disease. To obtain the 100 cases required it was necessary to go back about eleven years. The second group, all of whom died of their pulmonary tuberculosis, belonged only to the past three years. As might be expected the first or "cured" group had in general sought treatment at an earlier stage of their illness, and the average duration of their institutional treatment was only nine months, whereas it was eighteen months for the "dead." The most striking fact however is that the average interval during which the patients were infectious but not enjoying institutional treatment was eleven times longer for the "dead" than for the "cured"; in other words, their opportunities to convey the disease to others were much greater. A chronological study of the contacts in both groups showed how these opportunities had borne fruit. The cases of tuberculosis among the contacts of the "cured" patients *before* they fell ill were quite as numerous as those of the "dead" patients, but the harvest of cases among the contacts *after* the patients fell ill was very much greater for the "dead" than for the "cured" group. Within four years as many as 23 contacts of the "dead" cases had also died, and 18 others had developed open pulmonary tuberculosis. On the other hand, and in spite of a comparatively long observation period, only 5 of the contacts of the "cured" group had died of tuberculosis, 4 of them from meningitis in childhood. There is of course nothing new in the lesson of this study, but it is instructive because the facts and arguments are marshalled in an unusual way.

[1] Lassen, O., and Stigaard, A., *Ugeskr. Laeg.* July 21st, 1938, p. 807.

We regret to announce the death in London on Sunday last of Sir David Wilkie, professor of surgery since 1924 in the University of Edinburgh. He was 56 years old.

The drawing of The High, Oxford, on p. 471 of the Students' Guide last week, was by Mr. Bernard C. Gotch.

London Hospitals Street Collections.—The citizens of London used to contribute large sums, chiefly in pennies, on the various hospital flag days held throughout the year. These have now been combined and by means of the scheme that has evolved under the London Hospitals Street Collections central committee, both in 1937 and in 1938 as far as the collections have been completed, more money has been obtained for the hospitals. The general hospitals held their combined flag day in May and arrangements for the special hospitals section on Oct. 11th are now being made. This year 57 special hospitals are taking part as compared with 33 last year, and nearly 100 general hospitals combined in the May collections. Any suggestions and offers of service will be gratefully welcomed by Lord Luke, chairman of the committee, at 36, Kingsway, London, W.C.2.

SPECIAL ARTICLES

PROGNOSIS IN CARCINOMA OF THE BREAST

By R. W. Scarff, M.B. Lond.

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R. S. Handley, M.B. Camb.

ASSISTANT PATHOLOGIST TO THE HOSPITAL

(From the Bland-Sutton Institute of Pathology, Middlesex Hospital)

This investigation was undertaken in an attempt to determine what factors influence the progress of cases of carcinoma of the breast submitted to radical mastectomy, and to assess if possible the relative value of such factors in giving a prognosis in any individual case. It is primarily concerned with grading of the degree of malignancy on the histological appearances, but it is obvious that to consider this feature without reference to such matters as the degree of anatomical spread of the growth at operation, the length of the pre-operative history, or the age of the patient, is to discard possible assistance in a struggle which is already sufficiently difficult.

According to Haagensen (1933) it was Hansemann in 1893 who first drew attention to the relation between the histology and the malignancy of neoplasms. Broders (1921) however brought to more general notice the fact that the degree of anaplasia and de-differentiation of tumours was a measure of their malignancy; and Greenough (1925) first applied these criteria specifically to carcinoma of the breast. Since then, histological grading of breast tumours has had a mixed reception. Its enthusiasts believe that it is the one important factor in prognosis and Hueper and Schmitz (1929), with quaint ingenuity, have gone so far as to devise a "histological malignogram," based on twenty different criteria. Detractors have not been wanting, and Reimann (1929) believes that grading has no significance whatever. As is usual where such divergence of opinion exists, the truth probably lies between the two extremes.

Patey and Scarff (1928) surveyed the relationship between grading and prognosis in a short series of cases. Some of the cases had only been followed for three years after operation but the results encouraged more extensive investigations; and the present series is the outcome, though it does not include any of their original cases.

MATERIAL

This series consists of 172 patients, first operated on during the years 1925, 1926, and 1927, all of whom have therefore a chance of ten years' survival. With a single exception, all were treated by radical mastectomy, though often the notes stated that the operation was intended only as a palliative measure. Approximately one-third of the patients received prophylactic irradiation after operation but, as they were selected cases, no correlation between irradiation and prognosis was possible. The total number of cases in the records of the Bland-Sutton Institute of Pathology of the Middlesex Hospital during the three years was 235, but 63 were excluded for the reasons tabulated below.

It is a tribute to the follow-up department of the hospital that only 14 out of the 235 cases remain untraced, the majority during 1925, which year saw the inception of the present follow-up system.

18 cases	..	First seen with recurrent growth.
14 „	..	Untraced.
17 „	..	Incomplete data.
7 „	..	Died of other conditions.
4 „	..	Died immediately after operation.
2 „	..	Not graded.
1 case	..	Male.

In 30 of the 172 cases no cause of death could be ascertained, but it was presumed to be due to recurrence. In the remainder it was certified by the private doctor as due to recurrence, but in only a very small number was a post-mortem examination possible.

HISTOLOGICAL GRADING

The histological points on which the tumours have been graded are those used by Patey and Scarff (1928). Briefly they are:—

(1) Tubule formation. If well marked this is favourable.

(2) Marked irregularity in size and outline of nuclei. The greater the irregularity the worse the prognosis.

(3) The presence of hyperchromatic nuclei and of mitotic figures; the greater their numbers the worse the prognosis.

In addition the presence of secretion is considered favourable. Little stress has been laid on other points, such as cell degeneration, infiltration by lymphocytes, or the appearance of the stroma.

Using these criteria the tumours were divided into three grades, Grade I containing carcinoma of low malignancy, Grade III those of high malignancy, and Grade II the intermediate tumours. When grading was completed the clinical histories were obtained and compared; and the result is shown in Table I.

TABLE I—GRADING AND PROGNOSIS

Grade.	Cases.	Number alive—		Average time which those dead survived operation.
		After 5 years.	After 10 years.	
I	62	27 (45%)	19 (31%)	37 months.
II	66	19 (29%)	7 (11%)	33 „
III	44	10 (23%)	6 (13%)	29 „
Total ..	172	56 (33%)	32 (19%)	33 months.

It is at once evident that the grade of the tumour affects the prognosis since there are about twice as many patients surviving for ten years with Grade I tumours as with Grade III tumours. It is curious that there is not a greater difference, between the various grades, in the length of life of those who die within the ten-year period. An even more striking feature is the heavy mortality from recurrence between the five-year and ten-year periods, nearly half those who have survived five years dying before ten years have elapsed.

As has already been indicated it is inadvisable to consider the results of grading alone without reference to the stage which the growth has reached at the time of operation; for this purpose the cases have been

subdivided according to the presence or absence of growth in the axillary glands.

INVOLVEMENT OF AXILLARY GLANDS

Table II is constructed to show how microscopic evidence of involvement of the axillary lymph nodes affects prognosis. The presence of axillary metastasis

TABLE II—GLANDULAR INVOLVEMENT, GRADING, AND PROGNOSIS

—	—	Cases	Number alive— After 5 years.	Number alive— After 10 years.	Average time which those dead survived operation.
Without axillary involvement.	Total ..	47	34 (72%)	21 (45%)	59 months.
	Grade I	21	17 (81%)	12 (57%)	66 months.
	„ II	17	10 (59%)	4 (23%)	56 „
	„ III	9	7 (78%)	5 (56%)	55 „
With axillary involvement.	Total ..	125	22 (18%)	11 (9%)	27 months.
	Grade I	41	10 (24%)	7 (17%)	29 months.
	„ II	49	9 (18%)	3 (6%)	26 „
	„ III	35	3 (9%)	1 (3%)	26 „

is seen to be a catastrophe of the first magnitude; it is the most important single factor in prognosis. Five times as many patients with no glandular involvement live ten years as do the patients with glandular involvement.

Table II also analyses the cases to show the result of combining the condition of the axillary gland with the histological grading, and the figures produced are impressive. The difference between a Grade I tumour without axillary involvement and a Grade III tumour with axillary deposits is the difference between hope and despair. This Table again emphasises the difference between five-year and ten-year results.

AGE AND PROGNOSIS

It has been current teaching that carcinoma occurring in a young woman kills more rapidly than in an old woman. Our investigation has not borne this out and Table III shows that age has little bearing on prognosis. No significant variation has been found in the proportion of cases showing axillary involvement in the various age-groups.

TABLE III—AGE AND PROGNOSIS

Age in years ..	26–35	36–45	46–55	56–65	66–77
Cases.	14	36	59	37	26
Alive ten years after operation.	3 (21%)	13 (36%)	8 (14%)	8 (22%)	0
Survival of remainder in months.	27	33	32	36	35

PRE-OPERATIVE HISTORY

The correlation achieved between the length of pre-operative history and prognosis is not sufficiently striking to merit tabulation. The average length of pre-operative symptoms for the whole series was 10 months, for Grade I tumours 11 months, for Grade III tumours 7 months. Patients without axillary involvement had had symptoms for 7 months, on an average, whereas those with axillary metastasis had symptoms for 11 months. These figures are noteworthy in their tragic length.

DISCUSSION

The result of our work and that of many others shows that histological grading is of real importance in the prognosis of carcinoma of the breast, but that it loses much of its value if considered apart from the clinical stage of the disease. The condition of the axillary glands is a suitable, if arbitrary, index of the clinical stage, and correlation of histological grading with glandular involvement gives fairly reliable results.

In a series of cases there are patients who do not behave as would be expected from the gland condition and the grade of the growth; and it is these atypical cases which have led some workers to consider prognosis on such lines to be of as little use as casting a horoscope. But it must be remembered that prognosis, while leaving much to be desired, is as accurate in this as in many other diseases. The atypical cases may be the result of a change in the biological character of the growth but a more likely explanation lies in the arbitrary standard used to judge the clinical stage—i.e., involvement of the axillary glands. There are other paths of spread of which no information can be obtained; in the case of the lymphatics the internal mammary chain remains an important but unknown factor. W. Sampson Handley (1927) has produced clinical evidence to suggest the internal mammary chain is invaded at about the same time as the axillary nodes, but we have never secured material for microscopic proof because these glands are never removed.

In addition to confirming the definite though limited value of histology in prognosis, this investigation agrees in its general findings with the work of others—e.g., Patey and Scarff (1928), Haagensen (1933), and Sophian (1935). There is a lower incidence of axillary involvement in Grade I cases, and even when axillary deposits are present, survival is longer than in similar cases with Grade III growths. A comparison of the five-year and ten-year survival-rates in all categories lends emphasis to the truism that the word "cure" is to be avoided in cases of carcinoma.

SUMMARY AND CONCLUSIONS

1. A total of 172 patients subjected to radical mastectomy for carcinoma of the breast have been followed for ten years.

2. The results are tabulated to show the effects of histological grading, axillary metastasis, and age on the prognosis.

3. The presence or absence of axillary metastasis is the most important single facto. in prognosis.

4. Histological grading is also of value in giving a prognosis, and when combined with the findings in the axillary glands the correlation is striking.

5. Whereas only 19 per cent. of the whole series survived operation by ten years, 57 per cent. of patients with Grade I tumours and no axillary deposits, and 3 per cent. of patients with Grade III tumours and axillary metastasis survived for this time.

6. There is a marked difference between the five-year and ten-year survival-rate in all types of case.

7. Age has little effect on prognosis.

8. Length of pre-operative history and prognosis were not satisfactorily correlated.

REFERENCES

Broders, A. C. (1921) *Ann. Surg.* **73**, 141.
Greenough, R. B. (1925) *J. Cancer Res.* **9**, 453.
Haagensen, C. D. (1933) *Amer. J. Cancer*, **19**, 285.
Handley, W. S. (1927) *Surg. Gynec. Obstet.* **45**, 721.
Hueper, W. C., and Schmitz, H. (1929) *Ann. Surg.* **90**, 993.
Patey, D. H., and Scarff, R. W. (1928) *Lancet*, **1**, 801.
Reimann, S. P. (1929) *Arch. Path.* **8**, 803.
Sophian, L. (1935) *Ann. Surg.* **102**, 224.

THE PHYSIOLOGICAL CONGRESS AT ZÜRICH

(FROM A CORRESPONDENT)

AMID auspicious surroundings the International Physiological Congress had its sixteenth, or jubilee, meeting at Zürich from August 14th to 19th. The president, Prof. W. R. Hess, in a happy address of welcome, pointed out that the congress had been conceived in England in 1888, but was born at Basel in September of 1889 when a group of 129 physiologists met to hold their first congress. It was highly fitting, therefore, that the congress should return to Switzerland to celebrate its fiftieth anniversary; this time with a registration of more than 1600 members.

In recognition of the occasion the Physiological Society had appointed Dr. K. J. Franklin to write "A Short History of the International Congresses of Physiologists." This excellent record appeared in the *Annals of Science* for July 15th and in reprint form was presented by the society to all members of the congress. The "History" is appropriately dedicated to "Charles Scott Sherrington, one of the general secretaries of the congresses from 1892 to 1907, who by his experimental demonstrations at successive meetings and by his personal encouragement of younger physiologists has for half a century put into practice the principles laid down by the founders of the congresses."

The Zürich congress was notable for its observance of the principles of simplicity which Michael Foster and others insisted upon at the early congresses: a minimum of pomp and ceremony, no official delegates, quiet entertainment, often *en famille*, and a sympathetic and well-mannered press. The scientific proceedings were marvellously organised in five simultaneous programmes beginning on Monday afternoon, August 15th, and continuing twice daily (save for the excursion on Wednesday afternoon) until Friday afternoon. A new and highly successful feature of the congress were the fifteen symposia embracing set topics of current interest such as the kidney, acetylcholine, fœtal respiration, adrenal cortex, and vitamin B_2, at which the major contributions and principal discussions were by invitation. There were also many demonstrations, conspicuous among which was evidence of the growing popularity of cinematographic demonstration.

Scientifically speaking, it was generally felt that the Zürich congress was the most successful of any held in recent years, and it set a standard which English members will find it difficult to equal in 1941 when the seventeenth congress is to meet in Britain. From the international standpoint there were several features worthy of note. It was a source of profound regret, after the brilliant congress at Leningrad and Moscow in 1935, that not one Russian physiologist could be present in Zürich. Prof. Orbeli, however, was elected to succeed Pavlov on the international committee, and it is earnestly hoped that we shall be able to welcome him and his colleagues in England in 1941. A source of gratification to the entire congress was the large delegation of physiologists from Spain, led by Prof. Negrin himself and including Prof. August Pi Sunyer of Barcelona and Prof. Jaime Pi Sunyer of Santiago de Galicia. The German delegation was unexpectedly large, consisting of 130 members, though many eminent physiologists of Germany (including Bethe, Warburg, von Brücke, and Otto Loewi) were conspicuous by their absence. Drs. Oskar and Cecile Vogt happily were present in Zürich. Apart from several junior students from European laboratories, only one physiologist came from the Far East (Prof. Yas Kuno).

For its skill in handling the problems of diplomacy with which the congress was faced the Swiss committee deserves the admiration and gratitude of all those interested in the welfare of physiology; and in this connexion the names of Prof. Hess, and of Prof. Ernst Rothlin the general secretary, come most prominently to mind, together with that of their able assistant, Dr. Oskar Wyss. After unanimously voting to accept the invitation to meet in England in 1941, the congress responded enthusiastically to Prof. Houssay's invitation to meet in Buenos Aires in 1944; the South American invitation, however, will not be voted upon until 1941.

UNITED STATES OF AMERICA

(FROM OUR OWN CORRESPONDENTS)

SERUM TREATMENT OF TYPE I PNEUMONIA

THE experience of 877 physicians and 109 hospitals of the serum treatment of pneumonia in New York State during the 25 months from Jan. 1st, 1936, to Feb. 1st, 1938, has been assembled and analysed by the State Department of Health. In this period 2027 type I pneumococcus cases were treated with concentrated type-specific horse serum prepared by departmental laboratories. The results of treatment according to the day of illness on which it was instituted are shown in the following Table:—

Day of disease.	Number of cases.	Percentage of the whole number.	Deaths.	Case-fatality (per cent.).
1	130	6·5	16	12·3
2	473	23·6	54	11·4
3	489	24·4	67	13·7
4	359	17·9	59	16·4
5	221	11·0	37	16·7
6	139	6·9	33	23·7
7 and over	195	9·7	74	37·9
Total known	2006	100·0	340	16·9
Unknown ..	21	..	7	..
Total ..	2027	..	347	17·1

In the nature of the case it is not possible to supply control data of untreated cases. The case-fatality from type I pneumococcus in this country is generally reported as about 25 per cent.

Other observations derived from this study are that case-fatality increases with age although incidence is greatest in the age-group 10–49 years. Two-thirds of the cases were males. This sex ratio differs slightly from that of all forms of pneumonia, for which the incidence is 56 per cent. for males and 44 per cent. for females. Some evidence was found that pregnancy, especially in the last four months, decreases the chance of recovery. Otherwise case-fatality does not differ significantly in the two sexes nor is there any difference in the response to serum therapy. The case-fatality rate for the group in which bacteræmia was demonstrated was about three times as great as for the non-bacteræmic group. In 129 cases type-specific

serum was used in improperly typed or untyped cases. The crude case-fatality rate in this group was 28·7 per cent. which indicates that the use of non-specific serum is unjustified. Empyema was diagnosed in 137 cases, an incidence of 6·7 per cent. Mixed infections were reported in only 36 cases, with a case-fatality rate of 28 per cent.

CANADIAN COÖPERATIVES DISCUSS MEDICAL CARE

"Security against sickness" was one of the subjects discussed by a conference at the St. Francis Xavier University, Antigonish, N.S., on August 17th. Malnourishment is common and many teeth are uncared for according to a speaker from the extension department of the University. Modern medicine, he said, is not at fault in its science but in its economics. Group activity should replace individual action, both in the practice of medicine and in the purchase of health. He favoured voluntary over compulsory organisation of group medicine, admitting, however, that public health administration is a proper function of the State and should be paid for from taxes. A Glace Bay miner who is also a director of the British Coöperative Society of that place said that in Cape Breton centres they have group payment for individual practice. The system has been in effect there for 40 years. The doctor is selected by the patient and his payment is stopped for as long as the patient is sick. This it is held encourages the use of preventive medicine. The speaker considered that the method had been satisfactory in the past but the present need for specialist service made it inadequate. At present it is suggested that the 30 cents now paid weekly for hospital insurance be added to the 40 cents paid to the doctor, and for the total sum group practice and hospital care should be made available.

NUTRITION IN AUSTRALIA

(FROM OUR OWN CORRESPONDENTS)

To discover the present state of nutrition of the Australian people was the object of an investigation carried out by the Commonwealth Advisory Council on Nutrition, the results of which have been made available this month (August). The Council was appointed by the Commonwealth Government in 1936, following the recommendations of the League of Nations and International Labour Conference on problems of nutrition, and the statistical medico-social study it has made is the largest ever undertaken in the Commonwealth The results obtained are neither conclusive nor dramatic, but they are suggestive. There is evidence of widespread mild ill health produced by malnutrition, and much ignorance as to the proper balance of food items. Minor departures from normal health exist among young children in both town and country, and in the groups studied up to 33 per cent. were found to be in an unsatisfactory nutritional state.

The collection of data presented several problems, but there were two main lines of research—a survey of household dietaries in Sydney, Melbourne, Brisbane, Adelaide, and Perth, and a survey of the nutritional state of the children living in inland and city areas. An appeal was first made to the public, through the daily press, for records of the amount of food purchased in each household every day for a week, but the response was poor and trained workers then conducted a house-to-house canvass asking housewives to keep records (in a special book provided) for at least a month. For various reasons many people refused, and a serious difficulty arose. Efforts were made to ensure, as far as possible, that the booklets received from the 1789 families represented a true cross-section of the Australian population, but coöperation of housewives in itself presupposes an interest in and a knowledge of modern ideas of adequate nutrition. For this reason the picture as presented in the report must inevitably be somewhat more favourable than it really is. Moreover, coöperation was often obtained by means of the introduction provided at kindergartens and baby health centres. The report states that kindergartens have a striking influence on the state of nutrition of the children attending, partly through the distribution of milk and partly through the better knowledge of the mothers. This adds to the unbalanced nature of the returns. Again, only housewives living in the capital cities were considered. In the cities, with 47 per cent. of the total population, there is available a much wider range of food valuable for nutrition.

Chemical analyses for carbohydrate, fat, protein, ash, water, and fibre contents were carried out on the 1172 items of foodstuffs listed. The results showed no great difference in calories between comparable Australian and oversea foods. Cereals and meat in Australia both tended to be lower in protein than corresponding foods overseas, but the protein of fruits and vegetables was higher. On the basis of these estimations an "economic index" was drawn up, designed for times of national emergency, which shows the number of calories available, in 214 foodstuffs, for one penny. A supplementary list of foods gives the amount in grammes of protein, carbohydrate, and fat available for one penny.

An investigation of the mineral content of some Queensland foods revealed no serious deficiencies.

The weekly expenditure on food per "adult male" in Sydney, Brisbane, and Melbourne varied between 11*s.* and 13*s.* In Adelaide it averaged 10*s.* 2*d.* The low figure for Adelaide is said to result from the low consumption of milk and butter and the use of home-grown fruit. Approximately 34 lb. of food was purchased per "adult male" per week, the wastage allowance being 5–10 per cent. The fuel value of this average amount is more than sufficient to supply crude calorie requirements. Even on a calorie basis, however, 6 per cent. of the diets examined were inadequate.

In at least a quarter of the dietaries studied the consumption of milk and eggs was definitely below the minimum amount necessary for adequate nutrition. Consumption of potatoes was everywhere below what is considered desirable. Six per cent. of the families consumed half a pound or less fresh fruit per week per unit "adult male," and 12 per cent. only one pound per week per unit. There was no evidence of an inadequate consumption of butter. The Council states that there is room for efficient education of the people upon the relative value of the different foodstuffs. As families become larger, consumption of meat and fish gives way to bread, cereals, and sugar, and less "protective" foods are eaten. In families of six children the consumption of fruit and vegetables is 38 per cent. below standard, and milk consumption in similar families was less than half of the approved requirement.

The Australian Council has reduced the standards laid down by Steibeling and Ward to two-thirds of the figure for calcium, but retained their figures for phosphorus and iron. A study of the mineral contents

of the diets submitted showed an average of 29 per cent. deficient in calcium, 36 per cent. in phosphorus, and 68 per cent. in iron. These deficiencies also point to the need for a higher consumption of the "protective" foods. Although evidence of a gross shortage was found in only 6 per cent. of the diets studied, faulty selection of food is common and there is need for increased consumption of milk, cheese, potatoes, fresh fruit, fresh vegetables, and eggs. No attempt was made to survey the vitamin content of the foods used and while this is a serious omission it was beyond the scope of the inquiry.

INLAND SURVEY

The second section of the report deals with the remote interior districts of the eastern portion of Australia, conducted by Dr. F. W. Clements[1] of the Commonwealth department of health. His equipment consisted of a motor caravan with small laboratory and portable X ray unit. In the north-eastern portion of South Australia 14 per cent. of 925 children showed unsatisfactory nutrition. Undernourishment was associated with an excess of sweet foods. In Victoria 13·3 per cent. of 1249 children examined showed evidence of malnutrition, and in north-western New South Wales 23·7 per cent. Outstanding was the deficiency of milk, which is often difficult to obtain in these areas. In western Queensland there were serious defects in mineral salts in the foods consumed. In the larger railway towns of western Queensland excess carbohydrate intake was invariable. In one family the diet consisted entirely of fried bread for three meals. Many meals consisted solely of either bread and butter, or bread and syrup. Amongst 1399 children 18·8 per cent. were considered to be suffering from unsatisfactory nutrition. The mining town of Mt. Isa presented an interesting field of study as it is two towns in one, with different social conditions obtaining in each town. It was found that there were three times as many inadequate diets in the children attending the town school as in those attending the mines school. These figures are a tribute to the improved social conditions in the mining area.

Dr. Clements conducted a further survey of Sydney children in order to obtain figures comparable with those for the inland. Of 751 children examined, 19·3 per cent. were recorded as malnourished. Comparison of children attending kindergarten with those who were not doing so showed that attendance at kindergartens favourably influenced the nutrition of all age-groups. Two groups of children were examined and the improved nutrition of those attending kindergartens is all the more striking as the children attending them come from badly congested industrial suburbs, while the other children were drawn both from industrial suburbs and the better-class residential areas. These observations emphasise the importance of milk consumption as a determining factor of the state of nutrition. In kindergartens the consumption is at least a pint a day.

Finally (and this was the most arresting figure obtained) a further group of children between six and twelve years of age were studied in Sydney, and in this group 33 per cent. were found to be in an unsatisfactory nutritional condition. An important factor in this alarmingly high number was found to be the eating of numerous small "snacks" between regular meals. These small meals then consisted almost solely of carbohydrate-rich foods. Education is badly needed to correct this type of malnutrition.

[1] See *Lancet*, August 20th, 1938, p. 452.

ECONOMIC CONSIDERATIONS

In the third section of the report consideration is given to economic and other factors involved in the consumption of various valuable foods. Concerning milk, there is no insufficiency of supply in Australia, and it is economically preferable for dairy farmers to sell their milk as whole milk, but there is lack of appreciation of its nutritive value. There is also a poor consumption of cheese in Australia. Dealing with fresh vegetables and fruit, the Council urges an investigation into the possibility of improving distribution. It is suggested that the price is often higher than is justifiable, and fruit marketing organisations are urged to recognise more fully the nutritional needs of the community. This need is emphasised particularly for country districts.

FUTURE ACTION

As a guide for future action the Council recommends that the whole system of health supervision of children be immediately reviewed with the object of securing regular and complete supervision of bodily health during infancy and childhood to the age of sixteen; that regular instruction be given to all children in the elementary principles of hygiene and physical culture; and that regular instruction be given to all girls in the composition and preparation of food. The Council cannot accept the present state of supervision of child health as adequate. It believes that a definite extension along the lines indicated will receive widespread public approval. It also recommends that a central coördinated committee acceptable to all States of the Commonwealth be appointed to foster (1) the general health of the rising generation; (2) the correction of faulty dietary by the publication of dietary advice; and (3) the investigation and rectification of specialised local defects, both physical and nutritional. To implement these recommendations it has been suggested that a subcommittee of the National Health and Medical Research Council be formed to continue the function of the present advisory council on nutrition. It is obvious that the present survey has not been complete in any sense of the word. But sufficient evidence has been made available to indicate a state of affairs which is far below what is possible.

FELLOWSHIP OF MEDICINE AND POST-GRADUATE MEDICAL ASSOCIATION.—A course in physiology is now being held on Mondays, Wednesdays, and Fridays at 5.30 P.M. in preparation for the primary F.R.C.S. examination, and a course on diseases of the chest and heart, suitable for M.R.C.P. candidates, will be given at the Royal Chest Hospital from Sept. 12th to 30th on Mondays, Wednesdays, and Fridays at 8 P.M. An afternoon course in neurology (suitable for M.R.C.P. candidates) will be given at the West End Hospital for Nervous Diseases from Sept. 19th to Oct. 1st, and on three afternoons weekly from Oct. 3rd to Nov. 25th there will be a course suitable for D.P.M. candidates. A week-end course in rheumatism and hydrotherapy will take place at the Royal Bath Hospital, Harrogate, on Sept. 16th, 17th, and 18th, and a course in ophthalmology at the Royal Westminster Ophthalmic Hospital on Sept. 24th and 25th. Other courses include children's diseases at the Infants Hospital (Sept. 19th to 24th); proctology at the Gordon Hospital (Sept. 24th to 30th); medicine, surgery, and the specialties at the Metropolitan Hospital (Oct. 3rd to 8th); and plastic surgery (Sept. 14th and 15th). Courses are open only to members and further particulars may be had from the secretary of the fellowship, 1, Wimpole-street, London, W.

PUBLIC HEALTH

DIPHTHERIA IMMUNISATION

THE OPTIMUM SPACING OF THE DOSES OF ALUM-PRECIPITATED TOXOID

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DEPUTY MEDICAL OFFICER OF HEALTH, POOLE

In the annual report for 1935 of the medical officer of health, Poole, I recorded the results obtained with two small spaced doses of alum-precipitated toxoid in immunisation against diphtheria, and recommended this procedure as simple, safe, and efficient, to be used in preference to the one-dose method which at that time was being widely advocated. It is therefore interesting to note the recommendations of a subcommittee of the Society of Medical Officers of Health appointed to examine the present position of prophylactics against diphtheria with special reference to one-dose immunisation by alum-precipitated toxoid. This committee recently expressed the opinion that "The bulk of evidence appears to show that single injection of A.P.T. prophylaxis is not a sound immunological procedure in any normal area. Even the immediate results are not of sufficient merit for the method to be regarded as a justifiable one in any normal community. If A.P.T. is used, immunisation by at least two doses appears to be necessary."

In Poole, where this procedure has been used exclusively since March, 1935, very satisfactory results have been obtained. I have found that with two small but well-spaced doses of A.P.T. a high Schick-negative rate is consistently obtained (Chesney 1936 and 1937), and if it is accepted that the Schick-negative state is for practical purposes the objective in immunisation, then it can be asserted that this method attains its object.

ADVANTAGES OF TWO DOSES

There are two main factors which contribute largely to the success of the two-dose method. The first is the prolonged immunising action of A.P.T. As this relatively insoluble preparation is very slowly absorbed from the injection site, its stimulus is continuous for several weeks until absorption is complete. Frequently, three or four weeks after injection a small nodule is still palpable at the site. That this "depôt" contains toxoid has been demonstrated by animal experiments, the nodule, if excised, ground up, and reinjected into an animal, being capable of producing immunity by reason of the antigen still contained in it (Glenny, Buttle, and Stevens 1931). During this time the body cells are being trained to produce antitoxin, though the actual amount of circulating antitoxin produced by the primary injection may not be high. I have noted that, if non-immune children are given a primary dose of 0·1 or 0·2 c.cm. A.P.T., and Schick-tested two weeks later, an apparently unmodified Schick reaction results, the amount of circulating antitoxin produced in two weeks by this dose being insufficient to interfere with a positive reaction.

With a single subcutaneous injection of aluminium hydroxide toxoid, Jensen (1937) found that in children antitoxin production started between the 10th and the 21st day, and that the antigenic stimulus was continuous for at least three to four weeks. He recorded that, with the preparation used, a single injection—irrespective of the dose given—caused a detectable production of antitoxin in 95 per cent. of the cases treated, and he made the interesting observation that, "if considered in relation to the doses of the antigenic preparation, it is clear that the larger doses do not result in a conspicuous improvement in the effect." This observation indicates the value of the small initial dose of 0·1 c.cm. or 0·2 c.cm. as a primary antigenic stimulus, quite apart from its use as a detector of hypersensitive persons, and suggests that there is no immunological advantage in giving 0·5 c.cm. as an initial dose and thereby risking a sharp reaction in an untried subject.

The second factor which contributes to the good results with the two-dose method is an adequate spacing of the doses, the second dose being given at the optimum interval to secure a maximum response in antitoxin production. As the primary dose continues its training of the body cells for at least three to four weeks, the second dose should not be given, except in special circumstances, until at least four weeks have elapsed. This injection, acting on the already trained immunising mechanism, causes what O'Brien describes as an "explosive and massive production" of antitoxin and its action, like that of the primary stimulus, also continues for several weeks.

It is a well-known immunological fact that, with a given quantity of antigen, a better immunising stimulus is obtained by dividing the prophylactic into two or more doses and injecting at intervals than by giving it all in a single dose. Prigge (1937) referring to this "fractionated inoculation" emphasises the need for adequate spacing between the doses. In view of Jensen's observations regarding the period during which A.P.T. continues its immunising stimulus, it would appear that the value of the two-dose method is considerably reduced if the spacing between the doses is less than three weeks.

Recently Pöch and Schmid (1938) have shown by antitoxin titrations of blood samples that in children two small but adequately spaced doses of A.P.T. result in a much higher production of circulating antitoxin than a single dose of several times the total volume of the two doses. In children who had no appreciable antitoxin in the blood they gave two doses of 0·1 c.cm. at an interval of four weeks, and four weeks later estimated the amount of antitoxin per cubic centimetre of blood. They found that in 72 per cent. there had been a good response, in 18 per cent. the response was slight, and in 10 per cent. there was no appreciable change. In children treated with a single dose of 0·5 c.cm. they found that four weeks later only 31 per cent. showed a satisfactory amount of antitoxin, in 7 per cent. the response was slight, and in 62 per cent. there was no definite change. When, however, a dose of 1 c.cm. divided into two injections of 0·5 c.cm. was given simultaneously in different parts of the body, the response in antitoxin production was more satisfactory, 61 per cent. showing a good rise in antitoxin, 31 per cent. giving a slight response, and 8 per cent. showing no appreciable change.

OBSERVATIONS AND RESULTS

In the method I have used, the total volume of A.P.T. injected is 0·7 c.cm., 0·2 c.cm. being given as the primary dose and 0·5 c.cm. four weeks later as the secondary stimulus; it may be assumed that the immunising response with this volume is better than that obtained by Pöch by the injection of a volume of

0·2 c.cm. given in two doses of 0·1 c.cm. at a four weeks' interval. In 6 children who before treatment were non-immune as indicated by a positive Schick test, and whom I treated with the routine two doses of A.P.T. at an interval of four weeks, the blood antitoxin content was estimated two months after the second dose, and in each case a satisfactory amount of antitoxin was found, the highest titre being ½ antitoxic unit per c.cm. and the lowest 1/50th, the remainder having 1/5th A.U. per c.cm. in three cases and 1/25th in one case. These results may be regarded as an indication of the general trend of antitoxin production, though no serious conclusion can be drawn from such a small number of tests, but the results of Schick-testing over 1500 children two months after the second dose show that a satisfactory level of immunity is produced. A "fourfold" Schick reagent was used in over 63 per cent. of these tests and a high negative rate was obtained with this reagent, which marks a higher level of immunity than that indicated by the ordinary Schick-test in routine use in this country.

By the end of 1937, a group of 1934 children of whom 1656 were under ten years, and some 700 under five years old, had been treated by A.P.T. given in two spaced doses. In children under ten years, 0·2 c.cm. was given as the first dose, followed four weeks later by a dose of 0·4 or 0·5 c.cm., if no appreciable reaction had resulted from the primary detector dose. In cases which showed any reaction to the initial detector dose, the second dose was reduced in proportion to the amount of reaction. In children over ten years the primary dose was 0·1 c.cm., as in this age-group sharp reactions to A.P.T. are less frequent than in younger children. With this procedure the reaction difficulties encountered were negligible.

Children under ten years were not Schick-tested, as apart from the high Schick-positive rate in untreated children in this area I consider it a sound practice with young children to increase by artificial stimulus any existing natural immunity. Parish and Wright (1938) have shown that many children who are Schick-negative on primary test may have a "borderline" immunity, and the raising of the level of resistance in such cases is not only desirable, but may be necessary. The policy of Schick-testing children before immunisation is open to serious question.

Schick tests were carried out in 1555 children two months after the injection of the second dose, and only 6 cases showed a positive reaction. These results are all the more satisfactory in view of the fact that the "fourfold" Schick reagent was used in 983 cases, the ordinary standard Schick test being used in the remaining 572 children. If the Schick test is accepted as the practical indication of immunity to diphtheria this negative rate of over 99·6 per cent. may be regarded as evidence of the efficiency of this two-dose method of immunisation.

SUMMARY

Two small, but well-spaced doses of a reliable alum-precipitated toxoid give a very high rate of "Schick immunity," 99·6 per cent. of 1555 children being found to be Schick-negative two months after treatment with two doses of 0·2 and 0·5 c.cm. given at an interval of four weeks. A fourfold Schick reagent indicating a high level of immunity was used in 983 cases, the ordinary Schick toxin being used in the remaining 572.

I wish to express my thanks to Dr. R. A. O'Brien for supplies of the fourfold Schick reagent, to Mr. A. T. Glenny for carrying out the blood titrations, and to Dr. R. J. Maule Horne for helpful facilities in this work.

REFERENCES

Chesney, G. (1936) *Brit. med. J.* **1**, 208.
— (1937) *Ibid*, **1**, 807.
Glenny, A. T., Buttle, G. A. H., and Stevens, M. F. (1931) *J. Path. Bact.* **34**, 267.
Jensen, C. (1937) *Proc. R. Soc. Med.* **30**, 71.
Parish, H. J., and Wright, J. (1938) *Lancet*, **1**, 882.
Pöch, G., and Schmid, E. (1938) *Z. ImmunForsch.* **93**, 99.
Prigge, R. (1937) *Disch. med. Wschr.* **23**, 894.

PANEL AND CONTRACT PRACTICE

The Position in New Zealand

DURING the last few years the question of adopting compulsory health insurance has received much public attention in the British Dominions. In South Africa a draft scheme prepared by the Government is being considered by the various interests involved, and in Australia and British Columbia schemes have been adopted by the legislature but will not be put into operation until agreement with the medical profession has been reached on certain disputed conditions of medical service. In New Zealand the position is of special interest. The Government, which took office after their overwhelming victory at the general election in November, 1935, are under an election pledge to institute health insurance, and in considering the kind of scheme most suitable for the dominion they have had the advantage of conferring with Sir Walter Kinnear, and also with Sir Henry Brackenbury who visited New Zealand last year on behalf of the British Medical Association.[1] Since the profession is not opposed to health insurance, it was hoped that by a series of conferences between the Government and the doctors an agreed scheme would be formulated and brought into operation at an early date. Unfortunately this result has not been secured. Wide differences of view have appeared, not only on points of detail but on principles of basic importance.

The views of the doctors are set out in a memorandum prepared by the New Zealand branch of the British Medical Association. They are willing to coöperate with the Government in a system providing a complete range of medical services for all persons unable from their own resources to provide medical care for themselves. The Government scheme, which forms part of the Social Security Bill introduced into the legislature last month, is on very different lines. It provides a general practitioner service, a maternity service, and treatment in the public hospitals or payment of part of the cost of treatment in private hospitals. Specialist services, apart from hospital treatment, are not provided. No fees or contributions are payable by the patient. The cost of the medical services, together with that of the pensions scheme, which also forms part of the Social Security Bill, will be met by a special income-tax payable by all persons over 16. The scheme is limited in the range of treatment provided, but it is unlimited in its application; it is open to all members of the community irrespective of age or economic status. For both these reasons it is opposed by the doctors, who are pressing for a complete range of service open only to persons with incomes not exceeding a fixed limit.

[1] See *Lancet*, 1938, **1**, 447.

The New Zealand scheme does not provide what is understood as health insurance in this country; it is an instalment of a State medical service. It is advocated on the ground that since medical care is as essential to the community as education, it should, like education, be made free for all who choose to avail themselves of the services provided. The scheme would therefore involve no form of means test; and it is claimed that it would be less complicated and costly to administer than one limited to certain defined sections of the community. The doctors contend that it would in effect abolish private general practice, converting the practitioners into State servants, and that this would lead to a deterioration of the standard of practice, with disastrous consequences to the public. A cleavage of opinion has developed, and since both sides press their views as a matter of principle it is difficult to see how agreement can be reached. It seems, indeed, that the question is not unlikely to become a political issue to be fought out at the next general election, which takes place in November.

"I hereby Certify . . ."

The *National Insurance Gazette* of August 18th has a good deal to say about a doctor who issued on the same day six intermediate certificates stating that an insured person was incapacitated by pregnancy with sickness, by pregnancy with vomiting, and by pregnancy with debility. The certificates were dated in succession for the previous six weeks and stated that the doctor had examined the patient on each of those dates. Actually she had been confined in hospital two days after the date of the third certificate. The medical service subcommittee reported that they "were convinced of the practitioner's sincerity and accepted his apologies," and the insurance committee rejected a motion by an approved society representative that five pounds should be withheld from his remuneration. But our contemporary is not content:

> We do not question, says the *Gazette*, the doctor's sincerity in the present case. We have no doubt that he was anxious to do a genuine claimant a good turn. . . . For personal reasons the insurance committee may think that the doctor ought not to have been made an example of in the present case. But the certificates are plain and they will have to make a stand somewhere and sometime. We hope that they will make it now. . . . It is important that insured persons get it out of their heads that they can secure irregular certificates if they tell a good enough tale to a friendly doctor. Finally, when approved societies prove cases up to the hilt, they should not be led to believe that "it is no use complaining to some of these insurance committees."

The curious thing is that a reputable practitioner, in an attempt to assist one of his insured patients, should sign his name to a statement which he would never have written in his own hand. There is nothing in the certificate suggesting that a complete physical examination is necessary in every case, but words have no meaning unless the doctor sees his patient before he signs a certificate which says, "I hereby certify that I have examined you on the under-mentioned date." And it seems a pity to leave it to our contemporary to point this out.

GRAINS AND SCRUPLES

Under this heading appear week by week the unfettered thoughts of doctors in various occupations. Each contributor is responsible for the section for a month; his name can be seen later in the half-yearly index

BY "HAKIM"

I

In India European civil servants used to be able—I expect they are still—to contract for medical attendance on their wives and families at the rate of one week's pay in the year—they, of course, got free attendance for themselves. I used to welcome those contracts, but not so always the head of the family. If he were a Commissioner, a Judge, or somebody high up in the hierarchy of officials, a week's pay was quite a large sum, and just money for jam for the civil surgeon if the family kept well. On the other hand, for a long illness in the family a week's pay would come cheap compared to fees by the visit. Confinements were definitely extra. Commerce, alas, crept in even here. I was once asked by a senior official to enter into the usual contract, but not till after his wife had been running a temperature for several days, and looked as if she might be in for a long illness. He could—and should—have asked me months before, but he preferred to gamble on the family's health remaining good.

A junior Government official—he came to India when the movement for industrial education first started, and became head of a technical school—got a lot of medical attendance out of me for the small contribution of his week's pay. I didn't grudge it him either; I liked him, perhaps because he and his family had touching faith in their doctor. One incident stands clear in my mind. Their youngest was teething—and fractious. I prescribed a mixture with a grain or two of bromide in each dose. The dispensing chemist, a Bengali, overdid the dose—not by much. Realisation came to him late at night. He ran over to wake the household, crying out that he had poisoned the baby, who, as a matter of fact, was sleeping peacefully after a perfectly harmless overdose. But father proceeded to act. He woke the child by tickling its throat with a feather. It reacted normally, and after making rather a mess, started a prolonged howl. Mother got fussed, and whilst rushing about in deshabille, struck her head against a mirror—and flopped. Father promptly knelt on her and, taking a penknife, opened a vein in her arm before he dashed off for me. As we hurried to the house he related the circumstances, and when we arrived on the scene of confusion and carnage waved me in, saying proudly: "You see, I always know what to do in an emergency!" It was the number of emergencies he produced that gave me such a busy time with him.

* * *

Medicine is a really human profession. Barring family ties, there is hardly a closer relationship than that which the nature of a doctor's services establishes between him and his patient. It was partly, at least, to avoid having to sell these intimate services for money at so much a visit that many, like myself, entered a Service. From recollections of the years I actually was in practice I can recall the embarrassments of that fee-by-the-visit system. One might be interested in a case, and anxious about its course—the patient, perhaps, a child. If one looked in two or three times a day, as one might want to do, the

faces of the parents were apt to fall. One could almost see them thinking of the coming bill. By coming less often one risked being thought inattentive. I could never bring myself to charge a friend, which meant that often I never sent in an account at all —and yet a doctor must live.

* * *

I did some voluntary private practice from time to time, and was privileged for short periods when on leave to assist an old-fashioned doctor who, though he practised in the Western Highlands of Scotland, always wore a top-hat and a square-cut frock coat. Like the coastal rock of his country he was impervious alike to the mist of the glens and the rain of Atlantic gales. A wooden stethoscope bulged from a side pocket. He drove a gig with a fast-trotting horse between the shafts, and many a day he would go thirty or forty miles—ten out and back in one direction, and as many again in another—the last part of each journey following some narrow and bumpy track that wound into the hills. Tethering the horse at the foot of the glen, he would walk over the heather, climbing the hill to some lonely cottage which looked out upon the islands and the sea. I remember two journeys on dark and blustery nights with rain slanting across the dim circle of light from the oil lamps of the gig and the clip-clop of the horse's hooves muffled by splashes from deep puddles. Another vivid recollection is of noisy scenes on vaccination day when his surgery overflowed with mothers and babies, arm-to-arm vaccination being still the practice. A mother would display the bright pearly vesicles on her child's arm with pride, because the doctor had chosen to collect lymph from them—the lymph that was to be used on one or more of the waiting babies.

The moment the doctor entered the dwelling of a patient he was in complete command. The respect in which he was held, based on countless evidences of his wisdom and skill, especially in obstetrics, lost nothing by his autocratic manner. He knew for certain what was best for his patients, and he told them—often impatiently—and they believed him. He wasn't the kind of man to whom they could say "Make the bottle a bit stronger this time, doctor!" He would just answer "Tuts!" He had been made to shoulder responsibility early: the nearest specialist was over a hundred miles—and a steamer journey—distant; so he had to tackle anything that came along. I once did a successful mastoid operation for him on the kitchen table of a cottage hidden in the hills; he gave the anæsthetic to the woman who lay in her box-bed. I had a very primitive and meagre set of instruments to operate with; actually, I got into the mastoid cavity with a sterilised iron nail; for his surgical equipment was as simple as was his pharmacopœia. Salicylates and antipyrin—aspirin was new then—calomel and mag. sulph., vegetable pills, sod. bicarb., carbolic lotion, washing soda, and hot water would about cover the ordinary run of his remedies. But he knew the people he lived among. Nothing annoyed him more than the assumption that there was anyone resident in the district whose family he didn't know all about. "Who's he for a MacDonald?" he would be asked, and would immediately reel off a complete pedigree of every MacDonald within a radius of forty miles. If he could not place that particular MacDonald, he would say the man was an incomer—and 10 to 1 he would be right. His sentiments, like those of most good Scots, were deeply hidden. In some ways he was not a very understanding man, but necessity, interest, and a very human personality had driven him to understand how to treat the people who came to ask his advice.

* * *

But this type of autocratic doctor is out of fashion and his successors are having to face encroachment on their preserves from many directions. Some of the senior ones are accepting them with bad grace and are dreading the day when they will lose their independence altogether. The objections to a universal medical service would not be so apparent to one who has spent the best part of forty years in Government employment of one kind or another—of many kinds as it has happened, and in many climes. Yet one has only, and for the sake of argument, to advocate it to the average general practitioner—even a young one—to provoke violent opposition. Those who affirm that the backbone of the profession is the family doctor—and I am not denying it—argue that for the doctor to be the servant of anyone but his patients destroys the whole basis of intimate relationship between them, by interfering with the patient's free choice of a doctor. They admit that the State has a considerable—and statutory—claim on their services; still, to them, the private patient—panel patient included—who comes to them of his own free choice has the prior claim to attention. They add that Government service, by making the doctor a cog in a soulless machine, destroys all his keenness, and diminishes his incentive to give of his best in medical attention. I wonder whether that is true.

* * *

I don't remember that most of my fellow officers behaved like cogs in a soulless machine—I, certainly, never felt like one. But it must be admitted that to some—it is a matter of temperament—as middle-age approaches, when keenness has lost its edge, and when the rewards of early ambition are clearly seen to be unattainable, there is a temptation to mark time. "After all," they think, "the salary is adequate—there is a safe pension ahead—so why worry to do more than the daily routine?"

It may be assumed that the distribution of patients among State-paid doctors—if absolute freedom of choice were allowed—would be very uneven. Of two men equally paid, one might be idle and the other overworked. To me as an outsider, however, panel doctors seem to get as many patients as they want—or is it as they deserve?—up to the limit permitted.

And this brings me back to the question whether the patient really has free choice of doctor. The panel of the man he wants may be full, and if he is a private patient his choice is in practice confined to the doctor living fairly near his home. A compulsory move to another district inevitably means a fresh start with someone who does not "know his constitution."

Would it really be impracticable to run a universal panel? Perhaps not, especially if methods of selection could be devised to eliminate the temperamentally unsuitable. There are lots of other jobs, in preventive medicine and research, where temperament does not matter so much, where the doctor without tact would not have to deal with sick people whose emotions, frailties, and prejudices are enhanced by disease. Not that human understanding is less important in preventive medicine than in general practice. A temperamentally unsuitable G.P. can only nag at his family, or bully his patients—he daren't nag them; he can't, as can a man with administrative power, make hundreds of subordinates miserable.

SYNTHETIC CHEMISTRY AND MEDICINE

THE BRITISH ASSOCIATION SYMPOSIUM

Of the many subjects treated at the Cambridge meeting of the British Association one was of special importance to medical and biological workers. The title of the discussion was Repercussions of Synthetic Organic Chemistry on Biology and Medicine, and the meeting was held in the medical department on August 23rd with Prof. C. S. Gibson, F.R.S., in the chair.

Sir Gowland Hopkins, F.R.S., supplied an introduction which though brief was of great interest to the audience since, as he said, he was able to revive a number of memories of the early days of biochemistry. Having begun his work on what was then known as chemical physiology in the early 1880's, he could now look back over fifty years of biochemical progress. He recalled the unsympathetic attitude of organic chemists to biochemists in the early days, illustrated by the attitude of a distinguished organic chemist who suggested that the sink in the laboratory formed the best solution to the investigation of the compound produced for his consideration. The present discussion, said Sir Gowland, showed the friendly interest of organic chemists in biological problems and he ended his address with a word of warning that if progress in physiology and chemistry continued at the present rate the biochemist as understood to-day would probably be squeezed out of existence. He felt this would be undesirable since there was always room for the person with a mainly biological outlook.

THE NEW ŒSTROGENS

Prof. E. C. Dodds in opening the discussion described the work of himself and his colleagues on the production of synthetic œstrogenic compounds. The work had originated in the observation that a number of naturally occurring œstrogenic substances all had the same basic structure though they differed in a small degree in the grouping of certain double bonds and polar groups. This led to the suggestion that compounds of similar but simpler nature should be tested. Out of investigation grew a series of synthetic œstrogenic compounds derived from phenanthrene. None of these, however, had anything like the same degree of activity as œstrone, though the qualitative effects were the same (Cook, Dodds, Lawson, and Hewitt). The work was actively continued (Dodds and Lawson) and a further step forward was made towards simplification when it was found that the phenanthrene nucleus was not necessary. A long and devious path led finally to the synthesis of the substance 4 : 4′-dihydroxy-α : β-diethylstilbene (Dodds, Golberg, Lawson, and Robinson). This substance was found to be three times as active as the naturally occurring œstrone, and moreover was highly active by mouth. It afforded an entirely new reagent for both clinical and experimental biological work. Its clinical application was being very carefully studied, and various publications had already been made on its use as a biological agent,[1] for example in inhibiting the anterior lobe of the pituitary[2] and for the study of lactation.[3] In conclusion Prof. Dodds emphasised the theoretical importance of these investigations. Here was a substance bearing little or no resemblance to the naturally occurring substance yet far more potent. Perhaps a series of compounds of the same type could be worked out for other hormones and possibly vitamins, and on the basis of this an entirely new application of chemistry to medicine might perhaps be introduced which he suggested might be termed physiological chemotherapy.

[1] Dodds, E. C., Lawson, W., and Noble, R. L., *Lancet*, 1938, **1**, 1389.

[2] Noble, *Ibid*, July 23rd, 1938, p. 192.

[3] Folley, S. J., and Watson, H. M. S., *Ibid*, August 20th, 1938, p. 423.

STRUCTURE AND FUNCTION

Prof. L. Ruzicka (Zürich) followed with a highly technical summary of his work on the relationship of the structure of androgenic substances to biological action. He pointed out that there are four series of naturally occurring androgens; (1) androsterone and trans-dehydro-androsterone in human male urine; (2) testosterone in bull's testes; (3) adrenosterone in the suprarenal glands of bullocks and cows; and (4) androstadienone in the urine from a man with a tumour of the suprarenal gland. All these substances possessed androgenic activity which could be measured by power to produce comb-growth, growth of seminal vesicles and prostate, and other reactions. It was found that some were more powerful in one of these biological directions than another. The question of androgenic activity was, however, complicated by the large number of substances that may be prepared by the disintegration of sterols, such as cholesterol. Since Prof. Ruzicka had first prepared an active hormone-like substance by removal of the side-chain from certain selected sterols, over 50 other compounds have been prepared, differing from each other by alterations in the distribution of double-bonds and by differences in stereic configuration. Their biological activity seemed to be bound up with certain modifications of the groups round three of the carbon atoms, 3, 5, and 17, and the speaker suggested a scheme of classification for the essential characteristics of the molecules showing œstrogenic, androgenic, or progesterone-like activity.

MULTIPLE ACTIVITIES OF HORMONES

Mr. A. S. Parkes, Sc.D., F.R.S., began his communication with a reference to the very complex problem of definition. Whilst he hesitated to suggest a new series of technical terms he thought there were very grave objections to the use of the present ones. Though the term "androgenic" was comprehensive enough, and gave the impression of male hormone activity in general, the term "œstrogenic" was really not suitable since it referred only to the power of producing œstrus. The androgenic properties of molecules could be studied in a number of ways, as pointed out by Prof. Ruzicka, and so also could the female sex hormone properties of molecules; the power to produce œstrus represented only one side of female sex hormone activity. This distinction was not purely academic since in the case of the androgens it had been shown that the power to produce the various criteria of androgenic activity varies in different molecules. Dr. Parkes suggested the term "gynæcogenic" which he said would embrace the whole of the female hormone activities such as power to produce œstrus, enlargement of the uterus, and alteration of the plumage of capons. He also deplored the fact that no one had yet evolved an expression embracing progesterone-like activity. This again was important since a number of substances other than the progestational hormone progesterone could exhibit this characteristic activity. Much evidence had been brought forward to show that sex hormone activity in the œstrogenic field was by

no means confined to certain molecules, but the problem was even more complicated in that the androgenic substances possessed gynæcogenic properties and vice versa, and certain androgens were also capable of showing progestational activity. From this it followed there is no activity that can be regarded as specifically androgenic. As an example of the complexity of the situation may be quoted the fact that both androgens and œstrogens depress the action of the anterior lobe of the pituitary.

POLYCYCLIC HYDROCARBONS WITH CANCER-PRODUCING ACTION

Prof. J. W. COOK, F.R.S., said there was now a considerable group of polycyclic aromatic hydrocarbons that were known to be carcinogenic. They differed widely in the rapidity with which they produced tumours in animals, but the disease arising from their application was indistinguishable from that afflicting mankind. Cancer of the skin could be produced readily in mice by painting the animal repeatedly with a solution of the hydrocarbon; or rapidly growing sarcomatous tumours could be produced by subcutaneous injection of the same substances into mice, rats, or fowls. The organs capable of giving cancerous tumours under the influence of the carcinogenic hydrocarbons included also the liver, the uterus, the prostate, the hypophysis, the fore-stomach, and the brain, and the list was steadily being extended by the use of new techniques. So far, however, the manner in which these carcinogenic agents transformed the normal cells into malignant cells remained unknown. Nevertheless it was now possible to state some of the factors of molecular structure that were associated with carcinogenic activity. Thus it had been shown that the *meso* positions (9 and 10) of the benzanthracene molecule were both favourable positions for the development of carcinogenic activity, and the 9 : 10-dimethyl compound, with a methyl group in each of these *meso* positions, recently synthesised by Dr. Bachmann at the University of Michigan and tested at the Royal Cancer Hospital, had proved to be the most potent cancer-producing compound yet encountered, producing skin cancers in mice which made first appearance as multiple warts within 35 days. No other compound had produced tumours in less than double this time, with the exception of the similarly constituted 5 : 9 : 10-trimethyl-1 : 2-benzanthracene. The compounds taking the next places in the order of carcinogenic potencies were methylcholanthrene and 3 : 4-benzpyrene, for which the latent periods were approximately 75 and 100 days respectively. The structural relationships established between the carcinogenic methyl benzanthracenes enabled these two potent carcinogenic hydrocarbons to be correlated, but their main interest lay in the fact that methylcholanthrene could be prepared in the laboratory by comparatively simple reactions from cholesterol and the bile acids. It was conceivable that similar transformations could occur in the body, but evidence in support of this is lacking.

After speaking of the carcinogenic activity of the benzphenanthrene derivatives now being further studied Prof. Cook said in conclusion that besides the polycyclic aromatic hydrocarbons and their analogues, a number of other chemical compounds had been found to have carcinogenic properties, usually different in degree from those exhibited by the hydrocarbons. The availability of these chemical carcinogenic agents had assisted experimental work on cancer and would perhaps eventually contribute to a better understanding of the nature of cancer and assist in the search for therapeutic agents.

ADRENAL CORTICAL HORMONES

Dr. T. REICHSTEIN (Zürich) speaking on the structure of the cortical hormone summarised the chemical work that had been done since 1929–30, when the first stable active extract of suprarenal cortex was made. Four substances possessing biological activity had, he said, been isolated and characterised chemically; they were sterol derivatives possessing the familiar cyclopenteno phenanthrene skeleton. Their direct synthesis not being feasible at the present time, the possibility of producing similar compounds by sterol disintegration had been investigated. A very active substance, deoxycorticosterone, had been obtained which differed from the naturally occurring corticosterone in that it does not contain the hydroxy group in position 11. This substance had been found by biological tests to be more potent than the naturally occurring corticosterone, and Dr. Reichstein stated that since the preparation of his paper he had succeeded in isolating it from natural sources. This is a further example of a natural substance being prepared in the laboratory before being isolated from its natural environment.

VITAMIN B_1 AND SYNTHETIC ANALOGUES

Prof. A. R. TODD, in his contribution on aneurin, began by remarking that the antineuritic factor was the original "vitamin" since it was for it that Funk in 1911 at the Lister Institute coined the name "vitamine" which had since been adopted (with omission of the "e") as a generic term for the accessory food factors. For many years the vitamins had defied isolation, and it was not until 1926 that the first member of the group was isolated in pure condition. This was B_1, which Jansen and Donath isolated from rice polishings. Though widely distributed in the vegetable kingdom it was present only in very small quantities even in the best sources, such as yeast, and the germ and pericarp of cereals. The crowning-point of the chemical investigation of vitamin B_1 (or aneurin as it was often called nowadays) had been its artificial production in the laboratory, which was independently achieved by Andersag and Westphal in Germany, by Todd and Bergel in this country, and by Cline, Williams, and Finkelstein in America. The method used by the German and American workers had differed from the British—which was perhaps of greater practical value—but the product obtained was in every case identical with the natural vitamin both chemically and biologically. As a result of these syntheses the vitamin was now prepared commercially, and its availability had provided a considerable stimulus to medical and biological work. On the clinical side it was found that certain types of polyneuritis not hitherto believed to be of nutritional origin respond to treatment with the vitamin, particularly when injected, and it was probable that in these cases the patient was unable to utilise the vitamin ordinarily received in diet. Information was still lacking as to the function of aneurin in animals, although it was known to play a part in an enzyme system concerned with carbohydrate metabolism. Of great interest were the results of various workers who found that it was essential for the growth of many micro-organisms and that it functioned as a hormone in higher plants. It seemed that the separation of physiologically active substances into vitamins and hormones was somewhat arbitrary and that the two classes overlapped.

CORRESPONDENCE

TESTIMONIALS

To the Editor of THE LANCET

SIR,—I read with interest your leading article of August 20th (p. 441). It is hardly necessary for me to add that I entirely disagree with the impression it gives. For over thirty years I wrote testimonials, and it was my duty to do so. I have good reason to believe that young doctors, both men and women, benefited (justly) from them. A man or woman who has worked as a clinical clerk or resident, whether clever or not, if steady and painstaking deserves praise when it is required. If the man, who is helped both in time and in learning the art of teaching by them, forgets them he is to blame.

It has been my lot in life to struggle uphill in my profession with the advantage (if indeed it is one) that I learned how untrustworthy men may become when successful and holding responsible posts. Testimonials may have been and indeed have been prostituted and I have witnessed this gradual decline in worth, but what substitute is the secret letter or private conversation or referee? Intrigue plays no little part in medical life, and of that I am convinced not from books or from a hatred of the successful but from facing the facts of a long and rather widespread career.

The failure of testimonials is the failure of trust and a token of the failure of this civilisation, but this will not be remedied by the secret interview or bland forgetfulness of the lazy. I maintain that anyone who has worked steadfastly, humble or clever, is worthy of a testimonial from his chief, to be read publicly by responsible people, and should not be at the mercy of the secret interview and forgetfulness.

I am, Sir, yours faithfully,

Bath, August 19th. F. JOHN POYNTON.

VENEREAL DISEASES

To the Editor of THE LANCET

SIR,—Several very interesting points were raised by Dr. Seddon Taylor in his letter in your issue of August 13th. May I comment on some of them?

I am in entire agreement with him on the staffing of clinics, particularly those in the smaller towns which are usually controlled by the most junior of the medical officers of health, with little or no training in modern methods of treatment of these diseases. Again, I agree with him on the situation of many of these clinics. Those forming a department in a general hospital are often relegated to the most inconvenient part of the building, it may be a basement totally devoid of daylight. A separate and rather conspicuous entrance is usually provided. An ideal situation for a clinic would, as is suggested, be in the municipal offices. Such clinics are now to be found in the United States as part of a health centre and are proving to be very popular.

Concerning treatment and compulsion, on the other hand, I am strongly opposed to Dr. Seddon Taylor. I do not agree with the statement that the course of treatment of syphilis as advocated would lead to more individual cures. I am unaware of any statistics which prove that treatment without rest-periods is superior to that with rest-periods—rather the reverse. This subject was discussed in an article of mine which appeared in the *British Journal of Venereal Diseases* of April, 1933. The clinic with which I am associated deals for the most part with seafarers. It is financially impossible for these people to remain ashore for long periods, and hence we almost always have to give an intensive course of treatment with rest-periods of from three to six months, according to the stage of the disease. Unfortunately defaulters are common even with this type of treatment, and one wonders what would happen with the course advocated by Dr. Seddon Taylor. This question of the defaulter leads one directly to the question of compulsion and possibly notification. My own personal view is that such a measure would be useful and would be no hardship to the patient who is anxious to get better. It would go a long way to solving the problem of the defaulter.

I am, Sir, yours faithfully,

ERNEST E. PREBBLE,
Senior Assistant Medical Officer, Seamen's Dispensary, Liverpool.

August 29th.

MATERNAL MORTALITY AND MEDICAL EDUCATION

To the Editor of THE LANCET

SIR,—Dr. Elam accuses me of "attacking" Dr. Summerskill. I am reminded of a famous French couplet:

"Le chat est un animal méchant,
Quand on l'attaque il se défend."

I am in the position of that reprehensible animal. Dr. Summerskill, speaking as a doctor, told the House of Commons, a lay audience, that the teaching of midwifery in our medical schools is so inadequate that the resulting general practitioner is guilty of playing a confidence trick upon the public when he claims competence to attend midwifery cases, all of which in her opinion should consequently be sent into hospital. I followed Dr. Summerskill in the debate and as the only member of the present House with long experience on the staff of a great teaching hospital I felt impelled to defend the medical schools and to correct the very misleading impression she had sought to produce. My correction is supported by your correspondents, Dr. Falla and Dr. Scott. The latter's testimony is particularly impressive as he was a fellow-student of Dr. Summerskill's.

At the last full-dress debate on maternal mortality (Hansard, Jan. 28th, 1937) there was general agreement on all sides of the House for the view that the most urgent measure to reduce maternal mortality lay in the provision of continuous attention to the expectant mother throughout her pregnancy and very especially during the antenatal stage, which was in fact described by the Minister winding up the debate as "the most crucial period in the cure of maternal morbidity and the reduction of maternal mortality." There was further universal agreement that in furnishing this continuous attention the family practitioner was the most essential member of the triple team of usual medical adviser, midwife, and obstetric specialist which modern opinion would provide, wherever possible, in every confinement. That full provision—it is, I submit, generally accepted—is more important than securing actual delivery in a hospital. Dr. Summerskill, who would eliminate the general practitioner from the team, thus runs counter to the most expert and up-to-date views on this subject.

Dr. Elam suggests that I and my friends are resisting the betterment of training for midwifery by undue complacency with the present rates of maternal

mortality. The charge has no foundation in fact Speaking for myself, I hold the view that the further provision of maternity hospitals where the general practitioner can be trained more intensively than at present is a better way of improving the position than the withdrawal of any participation in midwifery by the general practitioner. I have voiced this opinion in the House whenever occasion offered. Nearly two years ago, taking advantage of inside information on the subject, I made public for the first time in the House the sensational improvement in the death-rate from puerperal fever, reduced from 22 to 4 per 1000, at Queen Charlotte's Hospital by the administration of Prontosil. I used this incident to stress the value of such hospitals as centres of research and teaching. And if in Dr. Elam's phrase my "friends" means the present Government, it has to its credit the provision during the past two years of 1000 more beds for maternity cases, as announced by the Under-Secretary in winding up the debate on July 28th.

The maternity hospitals under the control of the London County Council are to be congratulated on the reduction of their mortality-rate to "under 2 per 1000," but it is unreasonable to expect that the average rate for the whole country of just over 3 per 1000 could approach that result without supplying universally the conditions which mainly make it possible; the L.C.C. figures deal with a relatively restricted number of cases, all delivered by specialists and in hospitals lavishly equipped at the expense of the rates. The suggestion that such hospitals should be multiplied to afford accommodation for every expectant mother in the country may be entirely praiseworthy, but it is also entirely impracticable. Recognising, as we must, this impossibility it is comforting to reflect that the maternal mortality-rate at voluntary hospitals for women delivered in their own homes (and poor homes at that) by senior students who are embryo general practitioners is also "under 2 per 1000," the material dealt with being greatly larger and medically less satisfactory than that at the L.C.C. hospitals.

I am, Sir, yours faithfully,

The Athenæum, August 25th. E. GRAHAM-LITTLE.

CONTINUOUS DRAINAGE IN CEREBRO-SPINAL FEVER

To the Editor of THE LANCET

SIR,—Since my article on the Treatment of Cerebro-spinal Meningitis by Continuous Spinal Drainage was published in your journal on Nov. 27th, 1937, my attention has been drawn to some work on this subject recorded in the *Rivista di Clinica Pediatrica* (1935, **33**, 1) by Prof. Stefano Stefanini. His paper is entitled "La fistola rachidiana temporanea," and describes a new kind of apparatus, in the main similar to my own, but differing in two essentials, (1) the cannula is a simple bevel-pointed spinal needle of correct thecal depth provided with a small flange for its attachment to the skin; (2) the intraspinal pressure control is not of the fluid type but that of a mechanical pressure gauge with a circular dial. Stefanini appears to have had no difficulties in maintaining an uninterrupted flow of C.S.F. and the details of his nursing technique are not clear.

He used this apparatus in the treatment of both purulent meningitis and acute and chronic internal hydrocephalus. Stabilisation of the process was secured in two out of five cases of hydrocephalus; in the other three the treatment was unsuccessful. In one case of tuberculous meningitis the apparatus was tried without success.

The results with purulent meningitis, more especially of the meningococcal type, were perfect—a cure without after-effects. He found that the signs of cure were a drop in temperature, a clearing up of the C.S.F., and disappearance of the organisms. Eight cases of cerebro-spinal meningitis were treated, and these included four meningococcal cases in which the organism was found, two cases in which the causal organism is not mentioned, one case of tuberculous and one case of pneumococcus meningitis. The age period was from 0–6 years. The average amount drained per day was about 180 c.cm. Drainage was kept up in one case for as long as 17 days, during which period the total amount of C.S.F. drained was 5380 c.cm. Although the age of this case is not stated it is a remarkable achievement to keep a cannula in position for so long a time.

I wish by this letter to acknowledge Stefanini's claim to priority in this treatment, and to apologise for not mentioning his work; though I would at the same time like to point out that I laid no claim whatever to priority in treatment of meningitis by continuous spinal drainage, but stressed that my apparatus and technique were new.

I am, Sir, yours faithfully,

C. G. K. THOMPSON.

Grove Hospital, Tooting Graveney, S.W., August 28th.

CONTROL OF UNDULANT FEVER

To the Editor of THE LANCET

SIR,—A friend has kindly lent me his copy of your issue of August 6th, in which I have read with considerable interest the article on undulant fever by Sir Weldon Dalrymple-Champneys. During the past five years I have been engaged in the eradication of the *Brucella abortus* germ from my dairy herd, under the Government scheme for this disease and in conjunction with Dr. A. D. McEwen of Wye College, Ashford. The herd is "attested" and we are retailing Certified milk which is guaranteed "Brucella Abortus Free." The precautions which we take are stringent, but are now part of the ordinary routine of management and are, in my humble opinion, capable of being adopted by progressive farmers on a large scale.

I do not wish to take up space unduly, but perhaps some of the precautions may be of interest to your readers. (1) No milk is bottled from a cow which has recently calved until the result of the test is known. (2) Immediately a reactor or doubtful appears, this cow is removed to another farm and is used for suckling calves: this course has proved highly satisfactory for we now have 26 heifers in the herd which have been fed on milk from positive cows for the first four months of their life and none of them show any sign of reaction from eighteen months onward. (3) The complete herd of milking cows, including bulls, is tested every 2–3 months. (4) The bull is washed both before and after service with a weak solution of disinfectant.

I attribute the success achieved to (1) general cleanliness and a plentiful supply of disinfectant, particularly at calving-time; (2) home breeding of stock; (3) immunity from contact in the fields with neighbouring cattle; and (4) control of feeding, especially during the winter months when the cows receive a proportion of home-produced milled dried grass in their ration and also roots such as mangolds and kale which ensure health and stamina to the herd.

The following summary of the tests carried out over the past three years shows that we have the disease under complete control :—

Date of test.	Reactor.	Doubtful.	Total lost.
July, 1935 ..	7	2	9
Oct. „ ..	—	—	—
Jan., 1936 ..	—	—	—
April „ ..	—	1	1
May „ ..	2	—	2
July „ ..	—	—	—
Sept. „ ..	1	—	1
Dec. „ ..	2	—	2
March, 1937 ..	3	—	3
May „ ..	—	—	—
August „ ..	—	—	—
Oct. „ ..	2	—	2
Jan., 1938 ..	—	—	—
March „ ..	—	—	—
June „ ..	—	—	—
August „ ..	—	—	—

The loss for the first year was 12, for the second year 6, and for the third year only 2. The average number in the herd over the period was 55 cows.

I am, Sir, yours faithfully,

E. S. SHAXSON.

Elsted Manor Farms, Midhurst, Sussex, August 17th.

HYPERPLASIA OF THE MALE BREAST ACCOMPANYING MALIGNANT DISEASE OF THE TESTIS

To the Editor of THE LANCET

SIR,—In answer to Mr. Handfield-Jones's question in your issue of August 13th I am sorry to say that no serial sections of the testicular growths were cut; but in those which were histologically teratomatous one could I suppose suspect the presence of some chorionic tissue, and in the other case, a seminoma, it may be that the section was taken through an area of this description in a teratomatous growth. The interesting fact, I think, is that when the breast enlargement was present there were no signs of growth after very careful examination, and the patients have all remained well for many months. Apart from malignant conditions there remain the two cases in which the testicles were absent for years from atrophy and removal respectively.

I am, Sir, yours faithfully,

C. W. B. WOODHAM.

Nevern-square, S.W., August 25th.

MEDICAL NEWS

University of Cambridge

Dr. J. T. Irving, head of the physiology department of the Rowett Research Institute, Aberdeen, has been appointed university lecturer in physiology for three years from Oct. 1st.

Welsh National School of Medicine

The opening sessional address of this school will be given on Friday, Oct. 6th, at 4.45 P.M., by Lieut.-General W. P. MacArthur, director-general of the Army Medical Services.

Society of Apothecaries of London

At recent examinations the following candidates were successful :—

Surgery.—J. F. Cooper, T. L. B. Iredale, J. R. F. E. Jenkins, K. R. P. Kent, I. J. Mathias, C. R. Morgan, T. I. Palmer, E. F. G. Stewart, and J. Whitehead.

Medicine.—J. F. Cooper, E. K. Gardner, J. C. Gregory, B. M. Hulse, N. A. Jevons, J. A. V. Shone, and A. B. Taylor.

Forensic Medicine.—J. F. Cooper, E. K. Gardner, J. C. Gregory, B. M. Hulse, N. A. Jevons, J. A. V. Shone, and A. B. Taylor.

Midwifery.—J. V. Braithwaite, J. F. Cooper, E. K. Gardner, G. R. Green, J. A. L. Leeming, J. Lieber, N. W. R. Lucas, A. C. Rogers, T. I. Thomas, and J. W. Weston.

The following candidates, having completed the final examination, are granted the diploma of the society entitling them to practise medicine, surgery, and midwifery: J. F. Cooper, Charing Cross; J. C. Gregory, Camb. and St. Bart.'s; B. M. Hulse, Welsh National School of Medicine; I. J. Mathias, Guy's; and E. F. G. Stewart, St. Bart.'s.

Medical Society of London

This society has issued its programme for the first half of the session 1938–39. The presidential address will be given by Dr. C. E. Lakin on Oct. 10th, after the annual general meeting. On Oct. 24th Sir William Willcox and Mr. Eardley Holland will open a discussion on the use and misuse of sulphanilamide. On Nov. 14th the openers of a discussion on hormone therapy in gynæcological conditions will be Mr. Douglas MacLeod, Dr. P. M. F. Bishop, and Mr. W. R. Winterton. There will be a clinical meeting on Nov. 28th, and on Dec. 12th Mr. E. Pearce Gould and Dr. T. L. Hardy will discuss the preliminary investigation of cases of malignant disease of the breast and stomach. Next year the Lettsomian lectures will be delivered by Prof. G. Grey Turner on Feb. 20th, March 1st and 6th; he has chosen as his subject the surgery of the gall-bladder and bile-ducts. The annual oration will be given on May 8th by Prof. John Ryle, whose title will be Clinical Sense and Clinical Science.

London Hospital

A post-graduate course for former students of this hospital will be held from Oct. 12th to 15th. The Schorstein lecture will be given by Prof. Parsons on Thursday, Oct. 13th, at 4.15 P.M., and the old students' dinner will take place the same evening at 7.30 P.M. at the Trocadero Restaurant.

National Hospital for Diseases of the Heart

A special course will be held at this hospital from Oct. 3rd to 14th. In the morning there will be lectures and in the afternoons ward rounds and out-patient clinics. Further information may be had from the dean of the hospital, Westmoreland-street, London, W.1.

Westminster Hospital

Applications are invited for the Wander scholarship in diseases of children. The scholar, who receives a salary of £250 per annum, acts as clinical pathologist and registrar in the children's department of the hospital. Further particulars will be found in our advertisement columns.

St. Bartholomew's Hospital

The Derry Gardens on the acre of flat roof of the new building of Messrs. Derry and Toms in Kensington High-street have been thrown open since their completion for the benefit of hospitals and nurses' institutions in London, and over £4000 has already been received. During the week Sept. 5th to 10th they are to be seen by visitors from 9 A.M. to 6 P.M. on behalf of St. Bartholomew's Hospital. There is no charge for admission, but a contribution of one shilling and upward may be given to the nurses in attendance.

Saunders Books

In their mid-year catalogue Messrs. W. B. Saunders describe some 240 books on medical and allied subjects, 40 being newly published or recently revised. An account is also given of the annual Mayo Clinic volume of collected papers and of the latest additions to the two series of "Medical Clinics and Surgical Clinics of North America."

SULPHANILAMIDE IN GONORRHŒA.—Mr. A. J. Cokkinis and Dr. G. L. M. McElligott write: "We note that our article, published in THE LANCET on August 13th, has been quoted in a circular emanating from the medical propaganda section of a firm of manufacturing chemists, referring to the combined use of vaccine with sulphanilamide. We wish to point out that all stock vaccines used in our clinic are prepared in the inoculation department of St. Mary's Hospital, Paddington."

OBITUARY

ALEXANDER MACPHAIL, M.D. Glasg., F.R.F.P.S.

Dr. Macphail, who died last Sunday at the age of 65, will be remembered as a distinguished anatomist but more especially for his service to medicine as inspector of anatomy at the Ministry of Health. The youngest son of the writer Dugald Macphail, he was born and brought up in Glasgow where he matriculated in 1890 and graduated in medicine four years later, having meanwhile been editing the *University Magazine*. He then entered the anatomy rooms and demonstrated there until in 1900 he became dean of the faculty of medicine at St. Mungo's. In 1907 he left Glasgow to lecture on anatomy at King's College and Charing Cross and later, for ten years, at St. Bart.'s. He was elected to the University board of studies on human anatomy and morphology, becoming its chairman, while he examined in anatomy for three Scottish and two other universities. He was also secretary for England of the Anatomical Society. When after the war the teaching schools were faced with a pressing need of subjects for dissection, Macphail was appointed H.M. inspector of anatomy for England and Wales, with a medical officership at the Ministry of Health. It was his task on behalf of the Ministry to secure the assistance of boards of guardians, and later of public assistance committees, and the present smoothly running coördination of anatomical material at the various schools is the result of his energy and discretion. Apart from this, his special work, he lost no opportunity of furthering anatomical studies. His recent call to the chair of anatomy at the Royal Academy of Arts was a recognition which gave him great pleasure. At the beginning of this year his health began to fail and he had surrendered most of his official work before the summer came.

[*Elliott & Fry*

"We must have met fairly often," writes F. G. P., "from the time Macphail first came to London, but I only knew him really well after he succeeded Christopher (now Lord) Addison at St. Bartholomew's. The first clearly defined mental picture I have of him is his bringing a rather dilapidated tibia to St. Thomas's and asking me whether I saw any historical or osteological reason why it should not have belonged to Rahere who founded Bart.'s in or about 1123. I told him I believed it to have belonged to an adult male and that it certainly might have been only a bone for eight hundred years or so. With this he seemed quite content and went away to develop his thesis, though with what success I never heard.

"In those old days the standing of a lecturer on anatomy depended not so much on the quality of his lectures as on his success in obtaining supplies of material for dissection. He had first to persuade the now obsolete boards of guardians to grant permission for unclaimed bodies of inmates of workhouses to be sent to the medical schools and then to induce the masters to send them—two very different things. As secretary of the Anatomical Committee I had to supplement the efforts of the licensed teachers by further inducements that need not be described but I was always impressed by the way in which Macphail, by his tact and geniality alone, could induce these gentlemen to help us. How pleased I was when I heard he had been appointed H.M. inspector. They say that an old poacher makes the best gamekeeper and certainly under his control the difficulty of teaching medical students what the human body is like has been wonderfully lightened. Unlike his predecessors, he spent a large part of his time in visiting the various sources of supply and he obtained powers enabling him to insist on the boards of guardians listening to him whenever he wished to address them. No one but an old anatomist knows the abuse and insults with which we were treated by some of the members of these boards. Often they refused to give us even a hearing, and I remember one professor of anatomy who found himself being burnt in effigy in a town where he had gone to ask for help.

"Nothing of this kind ever happened to Macphail. He went as a Home Office official and was so tactful and courteous that he seldom went in vain. Later the Ministry of Health took over his department and the wretched old boards of guardians were replaced by county councils. Addison, I believe, had much to do with this, but Macphail always had his ear, and medical education little knows how greatly it is indebted to the initiative and hard work of this quiet, kindly gentleman who has passed from among us."

WILLIAM DELANO WALKER, M.B., B.Sc. Adelaide

Dr. W. D. Walker, who lost his life on August 20th in a flying accident near Catterick, was the son of an Australian surgeon, and it was in South Australia that he developed his natural love of living things and outdoor life. He had just begun medical study at Adelaide University when the war intervened, and he spent several years with the Australian Army Medical Corps in Europe. Returning to Adelaide he took a science degree with honours in 1923 and qualified in medicine in 1925, afterwards filling house appointments at the general and children's hospitals in Adelaide. Then, attracted by the possibilities of aerial medical service in Australia, he spent a prolonged honeymoon exploring the continent by horse, camel, and car, studying the conditions of the people in the sparsely settled interior. He took at this time many photographs of Australian wild life, for which he was later awarded the gold medal of the Royal Photographic Society in London. Special interest attaches to a series illustrating the birth of the kangaroo and its passage, as a minute fœtus little more than an inch long, from the birth canal into its mother's pouch to remain there for a long supplementary period of gestation. Coming to England in 1929 he tackled post-graduate study with the same zeal as he did everything else, holding resident appointments at a dozen different hospitals

before settling down to gain experience of the medical aspect of aviation as a civilian medical officer attached to the Royal Air Force. He was a keen pilot interested in the physical and physiological problems of the air. During this time he was lecturing in various parts of the country on natural life and anthropological problems in Australia, his audience being at one time or another the Royal Empire Society, the Zoological Society of London, the Royal Anthropological Institute, the Imperial Institute, and the Royal Photographic Society. Some of his photographs, hung at the International Exhibition of Natural History, are to be included in the permanent collection of the British Museum. He was developing photography also for his medical work, planning an atlas of surgical pathology for which he had taken many hundreds of exposures. Sir Thomas Oliver once introduced him to a gathering as one of Australia's foremost ambassadors, and his early death has cut short a career of singular vividness and promise.

THE LATE DR. ALFRED CAMPBELL

AN APPRECIATION

"The only really good cytoarchitectonic pictures are those of Campbell, who—let me put it in capital letters—HAS BEEN THE ONLY CYTOARCHITECTONIST WHO HAS DESCRIBED FACTS AND ONLY FACTS. The German cytoarchitectonist has mixed facts with theory in such a manner that nobody can tell where facts end and theories begin. I must state that there are perhaps no more than a dozen photographs out of hundreds in which the layers of the cortex have been properly and consistently labelled. On the other hand, Campbell's ink drawings beside being good, are easily reproduced." [1]

BORN in 1868 on his father's station at Cunningham Plains, near Harden, in Australia, Alfred Walter Campbell received his early education under the headmastership of the son of Robert Southey, the English poet, at Oakland School, near Mittagong. He left Australia in 1885 to enter the medical school at Edinburgh and in 1889 received his M.B. with honours. His attention had early been drawn to mental disease and he soon became one of that still small band who believe that the study of the structure of the brain and its aberrations may one day lead to a deeper understanding of the deranged mentality. He visited various English asylums and later went to Vienna where he was largely influenced by Krafft-Ebing; on leaving Vienna he proceeded to Prague where he served for a time on the staff of the State asylum of the metropolis. On returning to England in 1892 he obtained his M.D. degree (and gold medal) at Edinburgh for a thesis entitled "The Pathology of Alcoholic Insanity." He then accepted a dual appointment as staff member at Lancashire County Asylum and director of the pathological laboratory at Rainhill Asylum, Liverpool. In these capacities he had opportunity to see extraordinarily varied clinical material. The asylum became affiliated under his direction with the University of Liverpool and soon became a mecca for students and visitors from all parts of the world.

While at Liverpool Campbell became associated with Charles Sherrington and under this stimulus began his epoch-making studies on the structure of the cortex. In 1901 Grünbaum and Sherrington had published their physiological studies on the electrical excitability of the cerebral cortex in higher apes. Campbell had opportunity of seeing these experiments and the brains of many of the anthropoids were turned over to him for histological study. In the three years 1900–03 he accomplished the almost incredible task of cutting serial sections of each of twenty-five brains, staining his sections alternately for cells and for fibres, and preparing the material for publication in monographic form. This material was too extensive even for the *Transactions* of the Royal Society, but through Sherrington's influence a grant was made by the Society and the treatise was published by the Cambridge Press as a separate monograph. Campbell was an excellent draughtsman and, while many of his now classic plates were drawn by himself, he also had the assistance of his colleague, Dr. A. C. Wilson of the Rainhill Asylum. Among other things he defined the motor area as well as the premotor area on the histological basis which is now widely recognised. He had opportunity to examine brains of patients who had undergone, some time prior to death, amputation of one or more limbs, and he was able to show that atrophy in the motor region appeared to be restricted largely, if not wholly, to the gigantic cells of Betz. He also examined the post-central region in cases of tabes dorsalis. He recognised all the principal regions which had then, or have since, been recognised as having physiological significance.

After returning to Australia in 1905 Campbell published a number of additional papers on localisation of cerebral function, but the responsibilities of private practice in Sydney drew him away from investigative work and precluded him from making the contribution he might well have made to scientific neurology. As it was he became one of the most distinguished and respected practitioners in Australia. In 1906 he married Jennie, daughter of David Mackey, of Wallen Been Station, adjoining that on which he was born. There were two daughters of the marriage. In 1914 he volunteered for war service and was sent to Egypt; on his return to Australia he was appointed to the military hospital at Renwick, holding his post there until the time of his death, although he retired from practice early in 1937. He was consultant neurologist at the Royal Alexander Hospital for Children, the Coast Hospital, and the Department of Repatriation in Australia.

Campbell was a man of powerful Scottish physique who had always taken a keen interest in sport, especially golf and cricket, and was also a good marksman, a keen and well-informed ornithologist, and a botanist of distinction. He had a large library of works in the field of general history as well as in the history of medicine and science. All neurologists will wish to extend their sympathy to his family and to all his colleagues in Australia.

J. F. F

[1] Lorente de Nó, R., Architectonics and structure of the cerebral cortex. (Reprinted from J. F. Fulton's "Physiology of the Nervous System." London and New York: Oxford University Press. 1938. Pp. 291–327.)

THE LANCET 100 YEARS AGO

Sept. 1st, 1838, p. 797.

From a lecture on therapeutics by Dr. G. G. Sigmond.

The people in this country, when they once take it into their heads that a remedy is good for something, fancy it must be good for everything, and swallow it without having the fear of physic and of death before their eyes; . . . .

Vacancies

For further information refer to the advertisement columns

Albert Dock Hosp., Alnwick-road, E.—Res. Surg. O., £250. Also Res. M.O., at rate of £110.
Aylesbury, Royal Buckinghamshire Hosp.—Second Res. M.O., £150.
Barnstaple, North Devon Infirmary.—Sole Res. M.O., at rate of £150.
Bath, Royal United Hosp.—H.P. and H.S., each at rate of £150.
Bedford County Hosp.—First H.S., £155.
Birmingham and Midland Eye Hosp.—Res. Surg. O., £200.
Birmingham United Hosp.—Res. M.O. and Res. Surg. O., each at rate of £175. Also three Res. H.P.'s and three Res. H.S.'s, each at rate of £70.
Birmingham University.—Professorship of Anatomy, £1000.
Blackburn Royal Infirmary.—Res. H.P., £175.
Bolingbroke Hosp., Wandsworth Common, S.W.—Res. Surg. O., £200.
Bolton, Townleys Hosp., Farnworth.—Asst. M.O., £250.
Brentwood, Essex County Mental Hosp.—Asst. M.O., £510.
Burnley, Victoria Hosp.—H.S., £150–£200. Also H.P., at rate of £150.
Canterbury, Kent and Canterbury Hosp.—H.S., at rate of £125.
Central London Throat, Nose, and Ear Hosp., Gray's Inn-road, W.C.—Third Res. H.S., at rate of £75.
Charing Cross Hosp., W.C.—Medical Registrar, £150. Also Obstetric Registrar.
Chester Royal Infirmary.—Two H.S.'s, each £150.
Chesterfield and North Derbyshire Royal Hosp.—Cas. O. and Fracture H.S., at rate of £200.
Chorley Borough.—M.O.H., £800.
City of London Maternity Hosp., City-road, E.C.—Asst. Res. M.O., at rate of £80.
Dreadnought Hosp., Greenwich, S.E.—Med. Supt., £250. Also H.S. and H.P., each at rate of £110.
Durham County Council.—District Tuber. M.O., £500.
Edinburgh, Royal College of Surgeons.—Conservator of the Museum, &c., £1000.
Epsom County Hosp., Surrey.—First Asst. M.O., £350.
Exeter, Royal Devon and Exeter Hosp.—Three H.S.'s and H.P., each at rate of £150.
German Hosp., Dalston, E.—Hon. Ophth. Surgeon.
Glasgow University.—Barclay Lectureship in Surgery and Orthopædics, &c., at Royal Hospital for Sick Children, £700.
Gloucestershire County Council.—Asst. County M.O.H., £600.
Guildford, Royal Surrey County Hosp.—H.S., at rate of £150.
Hampstead General and North-west London Hosp., Haverstock Hill, N.W.—Cas. M.O., at rate of £100.
Hosp. for Sick Children, Great Ormond-street, W.C.—Out-patient M.O., £150. Also two H.P.'s, two H.S.'s, and three Out-patient Surgical Assts., each £50.
Hull Royal Infirmary.—H.S. to Spec. Depts., at rate of £150.
Indian Medical Service.—European Officers.
Ipswich, East Suffolk and Ipswich Hosp.—Asst. Pathologist, £450. Also Cas. O., £144.
Johannesburg, University of the Witwatersrand.—Prof. of Obstet. and Gynæcology, £1000.
King Edward Memorial Hosp., Ealing.—Res. M.O., at rate of £275.
Kingston County Hosp., Wolverton-avenue.—Res. Surgeon, £600.
Liverpool, Royal Children's Hosp.—Surg. Reg., £150. Also Med. Reg., at rate of £150.
Liverpool Heart Hosp.—Hon. Asst. Physician.
London Chest Hosp., Victoria Park, E.—Laryngologist.
London County Council.—Asst. Cons. Dental Surgeon, £750. Asst. M.O.'s for Mental Health Services, each £470. Also Asst. M.O., Grade II, £250.
Macclesfield General Infirmary.—Second H.S., at rate of £150.
Manchester, Ancoats Hosp.—Res. M.O., at rate of £150. Also Cas. O., £150.
Manchester, Prestwich Mental Hosp.—Locum Tenens M.O., 7 guineas per week.
Manchester and Salford Hosp. for Skin Diseases.—H.S., at rate of £150.
Manchester Municipal Hosps. Pathological Service.—Asst. Pathologist, £600.
Manchester Royal Infirmary.—Psychiatrist, £300. Also Res. M.O. for Private Patients' Home, £250.
Margate, Royal Sea Bathing Hosp.—H.S., at rate of £200.
Metropolitan Hosp., Kingsland-road, E.—Asst. M.O. in Physiotherapeutic Dept.
Middlesbrough, North Riding Infirmary.—Sen. H.S., £175.
Middlesex Hosp. and Medical School, W.—Med. Reg., £300.
Mildmay Mission Hosp., Austin-street, Bethnal Green, E.—Asst. Cas. O., at rate of £140.
Ministry of Health.—Six Medical Officers, £850.
National Temperance Hosp., Hampstead-road, N.W.—Res. M.O., at rate of £175. Also Cas. O. and H.S., at rate of £120 and £100 respectively.
Newport, Mon., Royal Gwent Hosp.—Cas. O., at rate of £135.
New Zealand, University of Otago and Dunedin Hosp.—Sen. Res. Surg. Officer, £500.
Northampton General Hosp.—Res. M.O.'s, each at rate of £150.
Nottingham Hosp. for Women.—H.S., at rate of £150.
Oldham Municipal Hosp.—Res. Obstet. Officer, £350.
Portsmouth, St. James Hosp., &c.—Locum Tenens Asst. M.O., 7 guineas a week.
Portsmouth City.—Tuber. Officer and Sen. M.O.H., £750.
Preston and County of Lancaster Royal Infirmary.—H.S. to Spec. Depts., at rate of £150.
Princess Elizabeth of York Hosp. for Children, Shadwell, E.—H.P., at rate of £125.
Princess Louise Kensington Hosp. for Children, St. Quintin-avenue, W.—H.S., at rate of £120–£150.
Queen's Hosp. for Children, Hackney-road, E.—H.P., and Ear Nose, and Throat H.S., each at rate of £100.
Reading, Royal Berkshire Hosp.—Res. H.P. and H.S., each at rate of £150.
Redhill, East Surrey Hosp.—Sen. H.S., at rate of £150.
Richmond Royal Hosp., Surrey.—Hon. Asst. Radiologist.
Rochdale Infirmary and Dispensary.—Sen. H.S., £250.
Royal Air Force.—M.O.'s.
Royal Cancer Hosp., Fulham-road, S.W.—Res. M.O., £200.
Royal London Ophthalmic Hosp., City-road, E.C.—Out-patient Officer, £100.
Royal Masonic Hosp., Ravenscourt Park, W.—Res. Surg. O., at rate of £250.
Royal National Orthopædic Hosp., 234, Great Portland-street, W.—Two H.S.'s, each at rate of £150.
Royal Northern Hosp., Holloway, N.—Tuberculosis Officer, £750. Med. Reg., £200. Also H.S., at rate of £70.
Ryde, Royal Isle of Wight County Hosp.—H.S., £140. Also H.P., £130.
St. John's Hosp., Lewisham, S.E.—Hon. Physician in Psychological Medicine.
St. Mary's Hosp., W.—Asst. Radiologist, £125.
Salford Royal Hosp.—Res. Surg. O., £200. Also H.P., three H.S.'s, and Cas. H.S., each at rate of £125.
Scarborough Hosp.—H.S. and H.P., each at rate of £150.
Southend Municipal Hosp.—Asst. M.O., £350.
Southend-on-Sea General Hosp.—R.M.O. and Med. Reg., £300. Also H.P., at rate of £100.
Southern Rhodesia Medical Service.—Government M.O., £600.
Stoke-on-Trent, North Staffordshire Royal Infirmary.—H.S., at rate of £150.
Sutton and Cheam Hosp., Sutton.—Sen. Res. M.O. and Jun. Res. M.O., at rate of £150 and £100 respectively.
Union of South Africa, Trafalgar-square, W.C.—Sen. Prof. Officer (Physiology) and Sen. Prof. Officer (Bio-Chemistry), each £700.
University College Hosp., Gower-street, W.C.—Hon. Asst. Anæsthetist.
Warrington Infirmary and Dispensary.—Third Resident, at rate of £150.
Warwickshire and Coventry Joint Committee for Tuberculosis.—Asst. Tuber. O., £600.
Weir Hosp., Weir-road, Balham, S.W.—Sen. Res. M.O., £250.
West Bromwich, Hallam Hosp.—Res. Obstet. Officer, £300. Also two Res. Asst. M.O.'s, each at rate of £200.
West End Hosp. for Nervous Diseases, Gloucester-gate, N.W.—Hon. Asst. Ophth. Surgeon. Also Hon. Surg. Asst.
West London Hosp., Hammersmith, W.—H.P., H.S., and Res. Anæsthetist, each at rate of £100.
Westminster Hosp., Broad Sanctuary, S.W.—Wander Scholarship in Diseases of Children, £250.
Wickford, Runwell Hosp. for Nervous and Mental Disorders.—Asst. Research Worker, £350.
Wigan, Royal Albert Edward Infirmary and Dispensary.—Res. Med. and Surg. Officer and Reg., £250.
Willesden General Hosp., Harlesden-road, N.W.—Res. Cas. O., at rate of £100.
Willesden Municipal Hosp., Brentfield-road, N.W.—Res. M.O., £250.
Windsor, King Edward VII Hosp.—H.S., £120.
Worcestershire Mental Hosp., Bromsgrove.—Second Asst. M.O., £350.
Wrexham and East Denbighshire War Memorial Hosp.—Two Res. H.S.'s, each at rate of £150.
York County Hosp.—H.S. to Eye, Ear, Nose, and Throat Dept., £150.

Erratum.—In the advertisement inviting applications for the appointment of Obstetric Registrar to Charing Cross Hospital, which appeared in our last issue, the honorarium should have been given as £100 per annum (see p. 48).

Births, Marriages, and Deaths

BIRTHS

HUMPHRIS.—On August 24th, at King's Lynn, the wife of Dr. J. Howard Humphris—a daughter.
LANDOR.—On August 16th, the wife of Dr. J. Victor Landor, of Singapore—a daughter.
MACFARLANE.—On August 26th, the wife of Dr. R. G. Macfarlane, of Northwood, Middlesex—a son.
SIMCOX.—On August 24th, at Bentinck-street, W., the wife of Dr. Ronald Simcox—a daughter.

MARRIAGES

RAINEY—GOODMAN.—On August 23rd, Edward Holmes Rainey, F.R.C.S., to Helen Ruth Goodman, M.D.
SWANSTON—HARTLEY.—On August 18th, at Bolton Abbey, Yorkshire, James Kelly Swanston, L.R.C.P.E., Thirsk to Florence Mary Hartley.

DEATHS

COAD.—On August 19th, at Mullion, Cornwall, Claude Norman Coad, M.C., M.B. Camb., aged 54.
MACPHAIL.—On August 28th, while on holiday, Alexander Macphail, M.D., F.R.F.P.S. Glasg., of Northwood, Middlesex, aged 65.
WALKER.—On August 20th, at Portlaw, County Waterford, David Faris Walker, M.D. Dubl., aged 68.
WILKIE.—On August 28th, in London, Sir David P. D. Wilkie, O.B.E., Ch.M. Edin., F.R.C.S., Professor of Surgery, University of Edinburgh.
WILLIAMSON.—On August 27th, at Northampton, Richard Ernest Williamson, M.B., C.M. Edin., T.D., J.P., aged 82.

N.B.—A fee of 7s. 6d. is charged for the insertion of Notices of Births, Marriages, and Deaths.

NOTES, COMMENTS, AND ABSTRACTS

TREATMENT OF DYSMENORRHŒA

BY A. D. STEVENSON

HEAD OF GYMNASTIC STAFF, CADBURY BROS., LTD., BOURNVILLE, BIRMINGHAM, 1914–38

THE problem of dysmenorrhœa in young girls seems to have become more important during the past few years from several aspects. We at Bournville are concerned particularly with the economic aspect, and there is no doubt that the loss of time and efficiency at frequent intervals extending over years is serious both from the point of view of employee and employer.

About ten years ago it was decided, mainly because of the good results claimed by Dr. Clow of Cheltenham, to adopt the treatment of dysmenorrhœa by remedial gymnastics. It was felt that Bournville factory, with its extensive organisation for gymnastic work generally, would be an ideal place to judge of the value of such treatment.

The cases were first seen by the works medical officer, who made some attempt to choose suitable ones. Although it is customary to classify dysmenorrhœa as spasmodic and congestive, it was found that many cases which appeared to be of spasmodic type were treated with good results. Girls suffering from the congestive type, however, formed the majority at our remedial gymnastic classes.

Generally speaking, the type of girl who suffers from dysmenorrhœa is the one whose work is more or less sedentary—about 60 per cent. of our series. We have often noticed that severe cases are normal during holiday times. The treatment has a strong mental influence as well as physical, and it is difficult to say where one ends and the other begins. It is quite probable that what was at first a "severe" pain becomes much more a "mild" pain even though actually of the same degree of intensity. The "hardening process" teaches these people to alter their valuation of pain as it were. This applies particularly to the neurotic type, for whom strict discipline is definitely beneficial.

The rationale of the treatment seems to be that by pelvic movements and exercises the circulation is increased through the pelvic viscera, venous stasis is relieved, and there is general increase of tone with relief especially of congestive types of pain.

THE MOVEMENTS

The principle of the movements is simplicity itself. The pelvis is made to move rhythmically in all directions; all static holding of difficult positions, and movements causing undue strain, are avoided. The movements used are flexion, extension, and rotation at the hips, and these three exercises alone seem to be sufficient; but in practice the avoidance of monotony is of prime importance. There is, therefore, much room for ingenuity on the part of the instructress in producing interesting variations.

Before the actual remedial movements for dysmenorrhœa are taken, the general circulation should be stimulated by vigorous arm swingings followed by skipping, jumping, and running.

A few of the standard movements will now be described in detail:—

1. Kneel on "all fours," reach as far forward as possible with the left arm, swing the left arm with straight elbow round to touch left foot, then swing arm back to position on "all fours" again. While this is being done, the hips are moved back on to the heels and up again rhythmically. Repeat with right arm. This should be done five times with each arm, the arms being moved alternately.

2. Kneeling position. Sit back on heels, at the same time turn to the left and touch the floor with both hands as near the left foot as possible—in that position tap the floor four times with both hands. Kneel up straight, and clap both hands above the head. This should be done five times alternately each side.

3. (*a*) Stand with feet apart, twist the body round from left to right, letting the arms, which should be raised to about shoulder height, swing with the body, giving impetus to the trunk twisting—four times each side. (*b*) Bend the body to the right letting the left arm swing over the head, repeat to left—four times each side. (*c*) Bend the body down letting the arms swing loosely between the feet, bend down four times.

4. Sitting on the floor, back against the wall, knees straight. (*a*) Draw the knees up; (*b*) clasp the hands round the ankles and pull the ankles as close to the body as possible; (*c*) stretch knees; (*d*) grasp ankles with knees straight.

5. Stand with feet apart, swing the right arm up above the head, and down to touch the left toe. Swing the arm up above head again and down to side (2 counts), repeat with the left arm touching right toe. During the movement the trunk moves down to the right and up, down to the left and up, alternately. An even rhythm should be kept.

The classes are held once a week. These five movements are carefully taught, and the girls are expected to repeat them every day, but more especially at the onset of the menstrual period. During the class, however, many more movements are done, but all are variations of the same principle. Monotony must be avoided.

Games and team races are introduced which involve pelvic movements. Quite a popular game is bean-picking: several handfuls of beans are thrown on the floor and the girls are required to pick them up singly, and put them on a high shelf. This involves rapid bending and stretching for about 1½ minutes. Needless to say the winner is the one who has got the largest number of beans on the shelf. Relay races cause great excitement; for instance, the girls crawl underneath a low beam, pick up five beans singly and put them on a high shelf, then run back to place over beams. This is just an example and one can think of several variations.

The girls should enjoy the class, and the invalid atmosphere is strictly kept out. They are encouraged to run, skip, and jump during their menstrual period, and to take part in the gymnastic classes in order to prevent dysmenorrhœa.

RESULTS

During the past ten years we have treated 107 cases which have been closely watched after treatment. All these girls were aged 14–18, except five whose ages ranged from 19–33. The results can be tabulated as follows:—

Normal	82	No relief	7
Much improved ..	8	Left class	10

The average length of time during which the successful cases were treated was eight months. The 7 cases which did not respond at all were definitely of the spasmodic type, and 5 showed much irregularity of periods.

A follow-up interview has just been undertaken on the normal cases and it has been found that in 51 cases (63 per cent.) the relief has been permanent for periods varying from one to ten years. In 2 cases (2 per cent.) relapse had occurred. The remaining 29 girls had left the works and could not be traced.

These results are very gratifying and it would seem that this method, because of its simplicity, could be applied much more widely—especially by industrial concerns employing large numbers of young girls.

SILICOSIS STUDIES IN FRANCE

In most English-speaking parts of the world silicosis has come to be regarded as a clear-cut disease-entity. At the International Conference on Silicosis held at Johannesburg in 1930 the basis of discussion was that silicosis is a disease sui generis due to the inhalation of silicon dioxide, distinct from, though often complicated by, tuberculosis. In the Anglo-Saxon world practically all the schemes by which workmen are compensated for silicosis are based upon this specific conception of the disease.

This doctrine has not escaped challenge in the past but it has perhaps never before been so deliberately assailed as by the recent publications of certain French authors. There has grown up in France an authoritative school of investigators, centring around A. Policard, who, in effect, deny the existence of silicosis as such, claiming that what passes for silicosis is really a modified form of tuberculosis. The most important of their recent publications is an original treatise [1] based upon the authors' own observations which cover a number of years of close contact with miners' phthisis. They give no reference to other people's work, no bibliography, but describe 64 cases of silicosis mostly complete with autopsy. Three-quarters of the book is taken up with case reports, which include clinical details, bacteriology, occupational history, roentgenograms, and pathological findings.

The main outcome of this study is that silicosis as a disease does not exist except there be tuberculous infection in the dust-ridden lung. Even cases which are generally regarded as "pure silicosis" present certain evidence of tuberculous change and in those cases where frank tuberculosis is superimposed there is no sharp distinction between silicotic and tuberculous lesions. The silicotic nodule which is structurally analogous to the fibroid tubercle is held to be a modification of the same pathological process. Silica is admitted to have a specific noxious effect, but only as an adjuvant to tuberculosis. It is suggested that silica dust alone, in the relatively low concentrations found under modern working conditions, is not, per se, a disease-producing agent. The authors point out that a considerable proportion of long-term miners seem to suffer no impairment in health from excessive quantities of silica in their lungs.

They are convinced that tubercle bacilli may be found in the sputum of "pure silicotics" if repeated examinations are undertaken, but on the whole bacteriological investigations have offered little support to their hypothesis. They are not dissuaded by failure to demonstrate Koch's bacillus in the silicotic nodule; if the nodule shows any caseation or calcification they are inclined to regard it as tuberculous on purely morphological grounds, even in the absence of other histological criteria.

Policard has tried to confirm his theory by experiment. With Dufour [2] he injected guinea-pigs intratracheally with an avirulent strain of tubercle bacillus (B C G) and subsequently exposed them to daily inhalation of siliceous dust from the mines of central France where silico-tuberculosis is prevalent. After 500 days or more of dusting these animals developed sclerotic, miliary lesions of the lungs, whereas the undusted controls recovered more or less completely from the B C G infection. These permanent miliary lesions were mostly dust-free and essentially tuberculous. Lesions produced by the dust alone consisted of interstitial lymphatic aggregations only and were less significant than the tuberculous nodulation. The authors believe the dust plays only an indirect part in the production of the characteristic nodule, probably by producing lymphatic stasis.

These results are somewhat in conflict with those of Gardner,[3] who performed similar experiments and was inclined to regard the dust as a direct excitant of the tuberculous process. In Policard's experiments the dust per se produced less fibrous reaction than in Gardner's. A possible explanation of this discrepancy is to be found in the fact that he used heavier concentrations of a dust with a higher silica content.

Nicaud [4] has recently reported on a histological study of fibroid tubercles occurring both in humans and experimental animals. The author shows that without the intervention of silica dust isolated tubercles may become completely fibrosed, giving rise to hyalinised nodules of whorled collagenous fibres morphologically indistinguishable from silicotic nodules. He finds the distribution of miliary tubercles in the lung to correspond with the characteristic distribution of silicotic nodules. On histological grounds he can see no reason for believing that the silicotic nodule is anything but a modified tubercle. He traces the stages of development of experimental tubercles and shows that in isolated instances they end up as purely fibrous nodules without any trace of caseation, giant cells, or granulomatous reaction. In the presence of silica this tendency towards complete fibrosis is greatly augmented.

Rist and his colleagues have described [5] a case of silicosis with autopsy which is relevant to this conception. A sandblaster, aged 42, worked for 11 years in a steel foundry, then developed dyspnœa of effort and loss of weight. Radiograms showed dense miliary nodulation throughout both lungs, the character of which did not alter over a period of three years. The sputum was always negative for tubercle bacilli, both on microscopic and bacteriological tests. Death resulted from spontaneous pneumothorax. Neither in the clinical nor in the autopsy findings was there any evidence of active tuberculosis. The case is one which would ordinarily be regarded as "pure silicosis." The nodules throughout the lungs were completely fibrosed, presenting no caseation, no giant cells, and no demonstrable tubercle bacilli; yet micro-incineration showed them to contain a calcareous (as well as a siliceous) residue and the authors are inclined to believe (with Policard, who examined their specimens) that the morphology, distribution, and calcareous content of the nodules point to a tuberculous origin.

These are careful, authoritative studies which deserve consideration. The conception of silicosis as a modified form of tuberculosis is somewhat heretical nowadays, but it is not new. Long before the term silicosis was introduced the disease was called "miners' phthisis" because most of its victims eventually develop tuberculosis. The theory that tuberculous infection always plays a part in the development of silicosis has not however, as yet, been satisfactorily demonstrated, nor is it held by all French observers. For example, Magnin [6] and Conrozier,[7] who have studied pulmonary disease amongst the coal-miners of the Gard district of France, believe that silica dust is the primary and essential factor in causing the silicosis of these workers. Magnin [8] has published a detailed criticism of the book by Croizier, Martin, and Policard in which the facts recorded and illustrated by these authors are given quite a different interpretation in the light of his own experience. Whether or not the theory that tuberculosis is an essential factor comes to be accepted need not affect the current conception of silicosis as an occupational disease peculiar to those who work in siliceous dust or lead to any slackening of effort in combating its dangers.

[1] La fibrose pulmonaire des mineurs. By L. Croizier, E. Martin, and A. Policard. Paris: Masson et Cie. 1938. Pp. 214. Frs. 165.

[2] Policard, A., and Dufour, A., *Ann. Méd.* 1937, **41**, 183.

[3] Gardner, L. U., *Amer. Rev. Tuberc.* 1929, **20**, 833.

[4] Nicaud, M. P., *Le Médecin d'Usine*, May, 1938, p. 24.

[5] Rist, E., Vallery-Radot, P., Mauric, G., Lemant, J., and Gauthier-Villars, Mlle., *Bull. Soc. méd. Hôp. Paris*, 1938, **54**, 214.

[6] Magnin, J., *Méd. du Trav.* 1935, **7**, 137.

[7] Conrozier and Magnin, *J. Radiol. Électrol.* 1937, **21**, 433.

[8] Magnin, *Méd. du Trav.* 1938, **10**, 97

HOLIDAYS FOR WORKING WOMEN

THE following letter reaches us from the Factory Girls' Country Holiday Fund :—

"Will you allow us once again to make a very urgent appeal for the poorest class of women and girl workers? The fund provides holidays and convalescent treatment all through the year for girls and women of all ages over fourteen. It is said that whenever two Englishmen meet in the summer they ask each other, 'When are you going for your holiday?' What of the thousands to whom such a question means little or nothing, who are yet the very people who most need a holiday? Living in the back streets of our great town there are girls and women who, through the Factory Girls' Holiday Fund, have been saving small sums up for months to get away for a short time. Now it is possible that they may have to forego the longed-for holiday, as our funds are exhausted, and their contributions do not go far to pay for their board, lodging, and travelling. Many of these bread-winners for their families, in these days of unemployment, are suffering from strain. Will your readers, as they look forward (or indeed backward) to their own holidays, remember these and send a contribution to the hon. treasurer, Mrs. Slater, Lowood, Hindhead, Surrey; or to Miss Canney, 36, Red Lion-street, Bedford-row, London, W.C.1."

The appeal is signed by the Bishop of London, the Countess of Sandwich, Miss Lilian Braithwaite, Miss Mary Paget, Miss May Wynne, and Lady Loch (chairman).

A DOCTOR UNDER THE KNIFE

Dr. Puder was a misguided young man. Whilst at work he developed a severe pain in the right side of his abdomen. Instead of going to bed and sending for a doctor or sticking to his post till he collapsed he must needs hurry home and waste two valuable days in attempts at self-diagnosis. When, in desperation, he at last summoned the family doctor he was again unfortunate. The disease was acute appendicitis but the attack was atypical and neither the general practitioner nor the surgeon subsequently called in were able to arrive at a diagnosis without the aid of a blood count and radiograms. The outcome of all this vacillation was a perforated appendix and local suppurative peritonitis. At the first operation, the abscess was drained and convalescence was interrupted by an almost fatal pneumonia. A second operation undertaken later in response to urgent symptoms, under local anæsthesia, discovered another focus of pus which was drained. Appendicectomy, under spinal anæsthesia this time, was finally and successfully performed at a third operation. The whole sad story is set out in a book [1] with an elaboration of detail reminiscent of those overheard in a doctor's waiting-room. It suggests an unphilosophical attitude towards disease occurring in one's own body which is happily rare among those with a medical training, and such highly coloured subjective accounts of illness seem to us at best discouraging.

NEW PREPARATIONS

LACTOFLAVINE B.D.H. (Vitamin B_2).—Lactoflavine is a synthetic pigment, pyrimidine-azine-benzene-dimethyl-*d*-ribose, identical with the naturally occurring substance generally associated with vitamin B_2 (the rat anti-dermatitis factor) and the pellagra-preventing factor (possibly nicotinic acid). Lactoflavine B.D.H., made by the British Drug Houses Ltd. (City-road, London, N.1), is recommended in the treatment of various forms of anæmia and of cyanotic conditions such as methæmoglobinæmia and sulphæmoglobinæmia; also in the treatment of cataract (together with ascorbic acid) and of certain forms of sterility of indeterminate origin. It is given by intramuscular or subcutaneous injection.

[1] On the Danger List. By Dr. Sándor Puder. London: Constable and Co. 1938. Pp. 187. 7*s*. 6*d*.

HEPARIN 318 ROCHE is described as "a solution of pure heparin, the physiological anticoagulant of animal blood." According to the manufacturers, Roche Products Ltd. (Welwyn Garden City, Herts), 0·5 c.cm. (2·5 mg.) of this preparation will inhibit the coagulation of 100 c.cm. of human blood for 1–60 hours in vitro, a much smaller quantity being sufficient if paraffined vessels are used. It is employed in blood transfusion in two ways: either it is added to the donor's blood after withdrawal, in place of such anticoagulants as sodium citrate, or it is injected into the donor intravenously to reduce the coagulability of his blood. Heparin is also being tried intramuscularly and intravenously for the prevention and treatment of thrombosis. Its various applications were reviewed in a leading article in THE LANCET of March 19th, 1938, and original communications have since appeared in our columns.

"VAPOROLE" SOLUTION OF ADRENALINE.—The oral inhalation of adrenaline 1 in 100 has been recommended for the relief of mild and moderate attacks of asthma; injection is obviated and it is said that side-effects such as nervousness and tachycardia are rare. A preparation of the requisite strength is now supplied by Burroughs Wellcome and Co. (Snow Hill-buildings, E.C.1) under the name of "Vaporole" Solution of Adrenaline, 1 in 100. It is sprayed into the mouth from an atomiser while the patient inhales deeply. Each cubic centimetre contains 0·018 gramme of adrenaline tartrate.

STREPTOCIDE SOLUTION.—Evans Sons Lescher and Webb Ltd. (Liverpool and London) now issue under this name a 2½ per cent. solution of Streptocide (Sulphanilamide Evans) for intramuscular injection. It is supplied in 5 c.cm. ampoules, each 10 c.cm. containing 0·25 g. of *p*-aminobenzenesulphonamide.

CALCYDIC TABLETS are put out by Allen and Hanburys Ltd. (Bethnal Green, E.2) as a source of calcium, phosphorus, and vitamin D appropriate in the treatment of rickets, chilblains, menorrhagia, urticaria, and dental caries, and during pregnancy and lactation. Each tablet contains 2½ grains of dicalcium phosphate and 500 international units of vitamin D, in chocolate-flavoured glucose.

GYNŒSTRYL is the name given by Roussel Laboratories Ltd. (36, Cavendish-square, W.1) to their preparation of œstradiol, its activity being standardised in "œstradiol international units 1935." They say that each tablet, with 250 of these units, corresponds biologically to 1250 I.U. of œstrone, and they advise that the product be taken by mouth in conditions of mild ovarian dysfunction. For injection in other cases they offer Benzo-Gynœstryl (œstradiol benzoate) in three strengths, ranging in potency from 1000 to 50,000 international benzoate units per c.cm. A third preparation, Sedo-Gynœstryl, combines œstradiol with sodium bromide and hyoscyamus.

Messrs. KNOLL LTD. (61, Welbeck-street, W.1) inform us that besides their ampoules and oral tablets of Dilaudid (dihydromorphinone) they now make tablets for hypodermic injection, containing gr. 1/32 and gr. 1/20.

A booklet on Protamine Insulin (with Zinc) Suspension has been issued by the BOOTS PURE DRUG CO. LTD. (Nottingham). It suggests how this form of insulin, produced by Boots in two concentrations (40 and 80 units per c.cm.), may be used in diabetes both mild and severe. Particulars of dosage and diet are briefly set out.

Messrs. SIEBE, GORMAN AND CO. LTD. (187, Westminster Bridge-road) send us a catalogue entitled "A.R.P. Equipment." Their range includes a general civilian respirator at 5*s*., clothes affording protection against vesicant gases, fire-fighting equipment, and the Haldane apparatus for oxygen treatment.

A NEW CIGARETTE-HOLDER

THE "Zeus" cigarette-holder, invented and made in the United States but now on sale in this country, consists of a detachable mouth-piece and a tube. Two cigarettes are used: one is put into the end of the holder in the ordinary way; the other is slipped into the tube and serves as a filter for the smoke. The "filter" cigarette is discarded when it becomes an obstacle to smoking, but it may last for 30 or 40 smokes; and there will seldom be much difficulty in finding another to take its place. The use of a tobacco filter of this kind is said to reduce the more noxious effects of the smoke but not to impair its taste or make it "flat."

ELEMENTARY STATISTICS

IN short space Mr. Holman[1] has expounded the elements of probability and the development of standard errors in problems of sampling, and discusses by example and precept some measures of variation, association, trend, and asymmetry. On the whole, the book is simple enough, but he shows a tendency, irritating to most adult readers, to believe that simplicity is achieved or increased by facetiousness. A reader who does not mind instruction framed in a jocular and occasionally a patronising tone will find in Mr. Holman a helpful guide to basic statistical ideas.

UNIVERSITY OF LONDON O.T.C.

DURING the second half of July the medical unit of the officers' training corps of the University of London was in training at Dibgate Camp, Shorncliffe, with the infantry, artillery, sound-ranging, engineer, and army service corps units of the University. Officer cadets in their first year were taught first-aid, squad drill, map-reading, stretcher exercises, and individual gas-protection. The aim was to fit them for duty as medical officers in charge of an infantry battalion. Those in their second year received instruction in the siting and working of field dressing-stations, to fit them to take their place as officers in a field ambulance. Those in their third and subsequent years were employed in the actual construction of sand-bagged and earthwork dressing-stations, in field exercises, and in the organisation of gas defence. They were also given a course in physical training. The unit was inspected by the deputy director-general of Army Medical Services. At the end of the training the practical examinations for Certificates A and B were held, with very satisfactory results.

As might be expected from the size of the London medical schools, the London University medical unit is the largest of its kind; its strength is limited to 400 and for four years it has been full, with a waiting-list. Medical students wishing to fill vacancies that will arise in October next should make early application to the officer commanding the company at their own hospital. Colonel Hope Carlton, who is in charge of the unit, points out that those who join will share in its activities with men from hospitals other than their own, and will acquire a knowledge of ambulance work which is given in no hospital curriculum, although it plays an essential part in industrial surgery. "Above all," he adds, "they will equip themselves to take their allotted place in national defence, for this training and that place are those chosen by the responsible military advisers of the Government."

Membership of the medical unit entails no expense. Further information will gladly be given if application is made to headquarters, 46, Russell-square, W.C.1.

INFECTIOUS DISEASE

IN ENGLAND AND WALES DURING THE WEEK ENDED AUGUST 20TH, 1938

Notifications.—Small-pox, 0; scarlet fever, 1067; diphtheria, 961; enteric fever, 34 (57 "expected"); pneumonia (primary or influenzal), 345; puerperal pyrexia, 154; cerebro-spinal fever, 24; acute poliomyelitis, 77; acute polio-encephalitis, 6; encephalitis lethargica, 4; relapsing fever, 1 (King's Lynn); dysentery, 29; ophthalmia neonatorum, 124. No case of cholera, plague, or typhus fever was notified during the week.

The peak of the late summer incidence of poliomyelitis has now apparently been passed, the total of poliomyelitis and polio-encephalitis cases combined being 81, 87, 63, 41, 29 for this and the preceding four weeks (working backwards). The 81 cases were scattered over 26 counties and 54 sanitary areas, the chief concentration being Essex, 18 (Braintree U.D. and R.D. 7, Lexden and Winstree R.D. 4).

The number of cases in the Infectious Hospitals of the London County Council on August 26th was 2562, which included: Scarlet fever, 493; diphtheria, 901 (carriers, 29); measles, 140; whooping-cough, 260; puerperal fever, 11 mothers (plus 6 babies); encephalitis lethargica, 277; poliomyelitis, 14. At St. Margaret's Hospital there were 29 babies (plus 14 mothers) with ophthalmia neonatorum.

Deaths.—In 126 great towns, including London, there was no death from small-pox or enteric fever, 2 (1) from measles, 1 (0) from scarlet fever, 7 (0) from whooping-cough, 25 (3) from diphtheria, 51 (16) from diarrhœa and enteritis under two years, and 8 (0) from influenza. The figures in parentheses are those for London itself.

The 2 deaths from measles were 1 in London and 1 in Oxford. Fatal cases of diphtheria occurred in 19 great towns, Liverpool reporting 3, Bolton and South Shields each 2. Birmingham had 5 deaths from diarrhœa, Stockton-on-Tees 3.

The number of stillbirths notified during the week was 235 (corresponding to a rate of 32 per thousand total births), including 31 in London.

[1] Simplified Statistics. By Leonard J. Holman, B.Sc. London: Sir Isaac Pitman and Sons. 1938. Pp. 142. 3s. 6d.

Appointments

ALLAN, I. MAY O., M.B. Aberd., Assistant Medical Officer of Health for Middlesbrough.

*BAILLIE, M. L., M.B. Lond., F.R.C.S. Eng., Resident Surgical Officer to Crumpsall Hospital, Manchester.

BOWES, KENNETH, M.D., M.S. Lond., F.R.C.S. Eng., Second Hon. Gynæcological Surgeon to the Wood Green and Southgate Hospital.

DOWLING, HEATHER, M.B. Sydney, D.M.R.E., Resident Radiologist at the Royal Infirmary, Leicester.

FISHER, J. H., M.B. Sydney, M.R.C.P. Lond., a Medical Chief Assistant at the Royal Infirmary, Manchester.

FOSTER, W. B., M.B. Lond., Resident Assistant Medical Officer, Battle Hospital, Reading.

GODBER, G. N. L., M.R.C.S. Eng., Assistant Medical Officer at the Kent County Mental Hospital, Maidstone.

GUERRINI, V. H., M.Sc. Dubl., Physicist to the Regional Radium Centre at the North Staffordshire Royal Infirmary, Stoke-on-Trent.

HEALEY, F. H., M.D. Birm., D.P.M., Medical Superintendent at the Norwich City Mental Hospital.

KITCHEN, G. H., M.B., F.R.C.S., Resident Surgical Officer at the Royal Salop Infirmary, Shrewsbury.

MADDISON, JOHN, M.D. Durh., D.P.H., Medical Officer of Health for Twickenham.

MCMATH, W. F. T., M.D. Belf., M.R.C.P. Lond., Medical Officer of Health for Batley.

MILLS, ELEANOR, M.B. Manch., Resident Surgical Officer at the Christie Hospital and Holt Radium Institute, Manchester.

OGILVIE, T. A., M.B. St. And., F.R.C.S. Edin., Hon. Assistant Surgeon to the Essex County Hospital, Colchester.

ROSS, ALICE M., M.B., F.R.C.S. Edin., D.M.R.E., Assistant Radiologist to the Radium Institute and Mount Vernon Hospital, London.

SAVAGE, S. W., M.D. Camb., D.P.H., County Medical Officer of Health for Herefordshire.

SHEPHERD, F. W., M.D. Camb., F.R.C.S. Eng., Resident Surgical Officer at the Royal Infirmary, Huddersfield.

WADE, H. J., M.D. Manch., M.R.C.P., a Medical Chief Assistant at the Royal Infirmary, Manchester.

London County Council Hospital Service.—The following appointments, promotion, and transfer are announced. A.M.O. (I) or (II) = Assistant Medical Officer (Grade I or II):—

MCCANN, J. J., M.B., M.R.C.P. Lond., A.M.O. (I), Hackney;
GRAFTON, H. F. P., M.D., M.C.O.G., A.M.O. (I), St. George-in-the-East;
GOTTLIEB, BENJAMIN, M.D. Durh., M.R.C.P. Lond., A.M.O. (I) Highgate;
VERNON, H. K., M.B. Durh., F.R.C.S. Eng., A.M.O. (I), Mile End;
PARK, R. G., M.B. N.Z., A.M.O. (II), St. Charles';
WOLFSON, L. J., M.R.C.S. Eng., A.M.O. (I), Lewisham; and
COCKBURN, T. A., M.D. Durh., A.M.O. (II), St. Pancras.

Examining Surgeons under the Factories Act, 1937: Dr. D. M. CRAIG (Framlingham District, Suffolk); Dr. WM. MACDONALD (Arisaig and Moidart (No. 1) District, Inverness).

* Subject to confirmation.